Winter 1982
Volume 26
Number 1

Mariners Weather Log

National Oceanic and Atmospheric Administration • Environmental Data and Information Service • National Oceanographic Data Center

U.S. DEPARTMENT OF COMMERCE
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ENVIRONMENTAL DATA AND INFORMATION SERVICE.
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Mariners Weather Log

Editor: Elwyn E. Wilson

January-February-March 1982
Volume 26, Number 1
Washington, D.C.

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_____ _____
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PLEASE PASS THIS ISSUE ALONG

Front Cover: The Mariners Weather Log celebrates its 25th anniversary with this issue. We hope we have been of service to the marine community by bringing to their attention and educating them on the hazards of weather. Your observations are as valuable as ever and the forecasts can only be as good as the analysis (observations). The photograph shows a tug boat frozen in the harbor at Kewaunee on Lake Michigan on January 2, 1982. Wide World Photo.

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1983.

The Mariners Weather Log (ISSN:0025-3367) is published quarterly by the National Oceanographic Data Center, Environmental Data and Information Service, NOAA, Washington, DC 20235 (telephone: 202-634-7394). Partial funding is provided by the National Weather Service, NOAA.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Annual subscription price: $8.00 domestic, $10.00 foreign. Single copies: $3.00 domestic, $3.75 foreign. Second-class postage paid to Finance Dept., USPS, Washington, DC 20260.

Mariners Weather Log

25th ANNIVERSARY

With this issue, the Mariners Weather Log celebrates its 25th Anniversary. In a foreword to the first issue, published in January 1957, F.W. Reichelderfer, Chief of the Weather Bureau, wrote:

> "The Mariners Weather Log... is published to fill a long recognized need to furnish information to mariners on the weather affecting marine commerce. The weather reports received from vessels at sea have always been essential to the success of our mission of recording, analyzing, forecasting, and summarizing the weather. Without the cooperation of the masters and men of our vast merchant marine in providing regular weather observations and records our task would be impossible."

This statement is as true today, 25 years later, as it was then. Weather covers the whole globe, and oceans account for over 70 percent of the Earth's surface. Despite all the advances made in observing and forecasting the weather, accurate, timely, on-the-spot observations are still indispensible. This is especially true over the oceans. Except for a few buoys near shore, cooperating ships are the only source for such observations.

The Mariners Weather Log is an invaluable means of communicating with the marine community that supplies these irreplaceable observations. It is also a source of marine climatological data unavailable in any other publication, such as worldwide data on tropical cyclones.

Innumerable letters and comments received over the years attest to the success of the Log in meeting the information needs of its user community and stand as a tribute to all who have contributed to its success.

Thomas D. Potter

Thomas D. Potter
Director, Environmental Data and
Information Service

PRELIMINARY HEIGHT AND PERIOD ADJUSTMENTS FOR VISUAL WAVE DATA

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It has generally been recognized that visual wave data climatologies reflect heights that are too low and periods that are too short. This paper offers preliminary correction factors that may be applied to existing climatic summaries that are based on a selection procedure that utilizes only the higher of sea and swell.

There are several reasons for the apparently reduced heights of summarized visual wave data from voluntary observing ships:

1. Until July 1963, only the higher wave train was digitized. Therefore, to mix pre-July 1963 data with later data in a consistent fashion, one could use only the higher of sea and swell. This, indeed, is the recommended procedure by the World Meteorological Organization (1960). By using only the higher of sea and swell, the significant wave height H_s (average height of the highest one-third of all waves present) is underestimated; a better estimate being:

$$H_s = (H^2\text{sea} + H^2\text{swell})^{1/2}$$

according to Darbyshire and Draper (1963), further elaborated by Jardine (1979), and Jardine and Lathan (1981).

2. A fair-weather bias toward lower waves is sometimes suspected, as ships may try to avoid bad weather (Quayle, 1974). However, since ships often must slow down in storms, more data will be reported, thus counteracting the fair-weather bias. Further, winds appear to be relatively more accurate than waves (Quayle, 1980), a situation that complicates simple "fair-weather bias" hypotheses.

3. The height of the bridge on a typical ship may be some tens of meters above the sea surface, thus making waves appear smaller than they actually are.

There is a more simple and direct reason for underestimation of wave periods. When more than one wave train is present, observers may tend to time the passage of the crest of one train to the crest of another interceding wave, rather than the next crest of the intended wave train. This will result in an underestimation. The complexity of earlier WMO codes may have also caused some confusion, but the relationship of this to baising on the low side is not clear.

The most comprehensive and readily available coastal summaries of ship data are the U.S. Navy SSMO's (1971-81). Recently a set of tables similar to SSMO's, but much more comprehensive, was published for selected points along the eastern U.S. coastline (Corson, et al., 1981). These wave data were calculated via a hindcast technique utilizing 20 yr of data, with results considered more representative of the actual wave climatology than random visual estimates from ships. Our objective was to develop a relationship between the hindcast and SSMO data which could be applied to all visual data. Five hindcast points along the coast from New England to Florida and a sixth near Puerto Rico were chosen for comparison with the nearest SSMO area data.

SSMO tables were initially modified by removing all data with indeterminate periods, setting periods <6 sec equal to 5.5 and >13 sec equal to 18. Seasonal and annual cumulative relative frequency (CRF) graphs were developed separately for the height and period statistics for each hindcast point and the coincident SSMO area. For each SSMO height and period class midpoint an equivalent hindcast height and period was determined. This was done by determining the CRF for each SSMO height (or period) midpoint, then determining the hindcast height (or period) value associated with that CRF for the same area and season. TheSSMO and equivalent hindcast values for all six areas were plotted seasonally and annually and lines of best fit calculated. In effect, seasonal and annual transformations of SSMO data to approximated hindcast period and height data resulted. The original SSMO height and period class midpoints and the transformed annual values (in parentheses) are: height-meters .25 (.25), .50 (.59), 1.00 (1.28), 1.50 (1.97), 2.00 (2.66), 2.50 (3.35), 3.00 (4.04), 3.50 (4.73), 4.25 (5.76), 5.25 (7.14), 6.25 (8.40), 7.25 (9.89), 8.75 (11.96), 11.00 (15.05), 13.50 (18.50), 16.50 (22.63), 19.75 (27.10); period-seconds 5.50 (7.91), 6.50 (8.73), 8.50 (10.38), 10.50 (12.03), 12.50 (13.68), 18.00 (18.22).

The results are plotted in Fig. 1 for heights, and Fig. 2 for periods with the scatter of points depicting the range of transformed versus original values for the six areas chosen. These can theoretically be applied to any summaries where the system of using the higher of sea or swell was employed (SSMO's, atlases, Pilot Charts, etc.). Results are termed "Preliminary"

because they were obtained from such a limited sample. It is hoped that more complete data analyses can be performed in the future.

ACKNOWLEDGEMENT

Thanks are expressed to Ron Baldwin for the ADP work.

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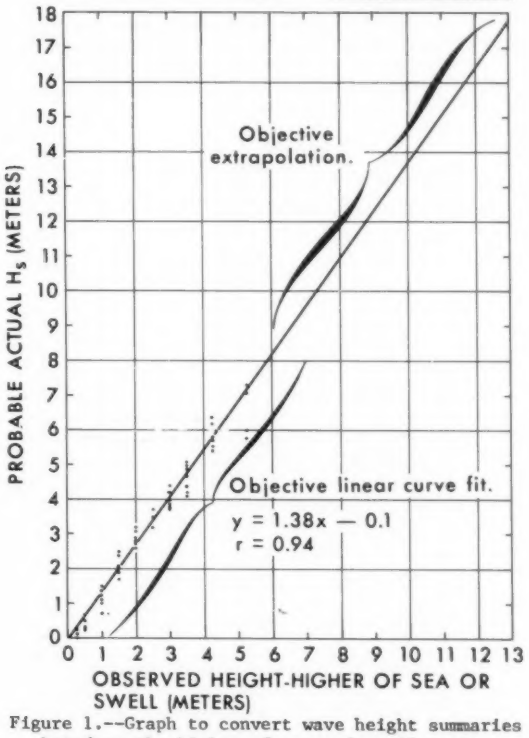

Figure 1.--Graph to convert wave height summaries based on the higher of sea and swell to improved estimates of actual significant wave height.

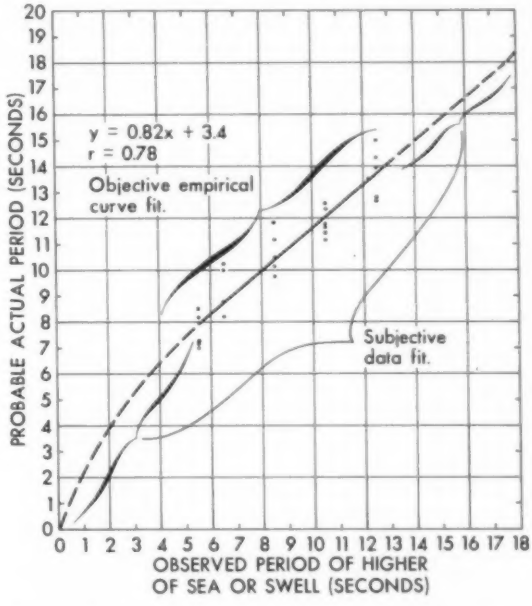

Figure 2.--Graph to convert wave period summaries based on the higher of sea and swell to an improved estimate of the period of the significant waves.

WE OF NOAA ARE MAKING USE OF THIS SMALL AMOUNT OF SPACE TO EXTEND OUR THANKS TO ALL THE SHIPS' OFFICERS WHO ROUTINELY TAKE SHIPBOARD WEATHER OBSERVATIONS. TO US, THESE EXCELLENT OBSERVATIONS ARE PRICELESS. WE CERTAINLY DO APPRECIATE RECEIVING THEM REGULARLY.

Mariners Weather Log

NORTH ATLANTIC TROPICAL CYCLONES, 1981

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All of the tropical storms and hurricanes in 1981 formed in the Atlantic except for the first and last storms of the year. For only the third time this century, not a single storm entered the Gulf of Mexico, and storms existed in the Caribbean Sea on only 5 days. The season was dominated by a series of five September hurricanes that tracked northward through the western Atlantic and then curved toward the northeast (fig. 3). Shipping in the western Atlantic was disrupted by the existence of one or more storms almost continuously during August and September.

Even though the season got off to an early start with Arlene in May and ended late with Katrina in November, the totals of four tropical storms and seven hurricanes were near the long term averages of four and six, respectively (tables 1-3). No hurricane made landfall. Tropical Storm Dennis dumped 20 in of rain on south Florida causing damages estimated at $25 million. Tropical Storm Katrina caused two deaths in Cuba, the only known storm fatalities of the year. This was only the fourth year in the past 40 in which there were no deaths in the United States caused by tropical cyclones (table 2). A summary of tropical cyclone statistics is given in table 1.

A list of reports from ships which encountered winds of 50 kn or more is given in table 4. Hurricane force winds were reported from the vicinity of only two storms, Harvey and Irene, the two strongest hurricanes of the year.

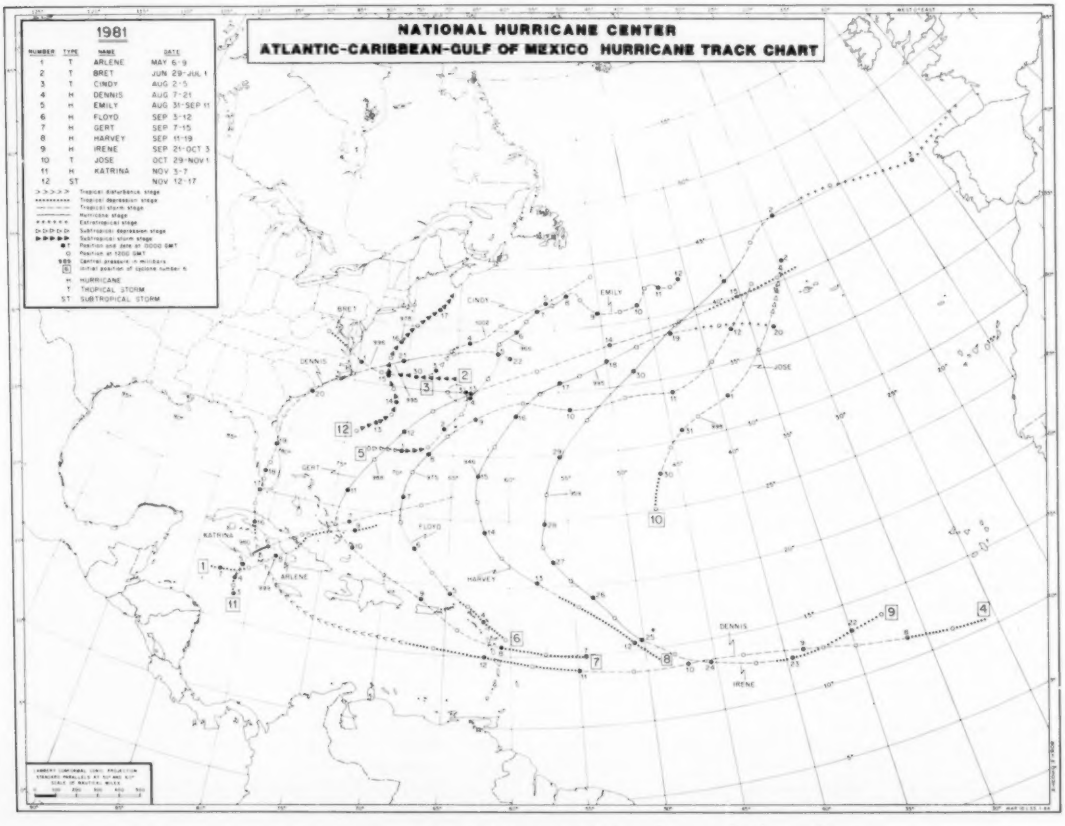

Figure 3.--Tracks of the 1981 North Atlantic tropical cyclones.

Table 1.--North Atlantic tropical cyclone statistics, 1981

Cyclone number	Name	Class[1]	Dates[2]	Maximum sustained wind (kn)	Lowest pressure (mb)	U.S. damage (millions of $)	Deaths
1	Arlene	T	May 6-9	50	999		
2	Bret	T	Jun 29-Jul 1	60	996	minor	
3	Cindy	T	Aug 2-5	50	1002		
4	Dennis	H	Aug 7-21	70	995	25	
5	Emily	H	August 31-Sep 11	80	966		
6	Floyd	H	Sep 3-12	100	975		
7	Gert	H	Sep 7-15	90	988		
8	Harvey	H	Sep 11-19	115	946		
9	Irene	H	Sep 21-Oct 3	105	959		
10	Jose	T	Oct 29-Nov 1	45	998		
11	Katrina	H	Nov 3-7	75	980		Cuba 2
12		ST	Nov 12-17	60	978	minor	

[1] T - tropical storm (winds 34-63 kn)
H - hurricane (winds 64 kn or higher)
ST - subtropical storm (winds 34-63 kn)

[2] Day starts at 0000 GMT

TROPICAL STORM ARLENE - MAY 6-9

Arlene was only the 14th tropical storm to form in May according to records dating back to 1886. Arlene was also unusual in that it formed from a weather disturbance that moved into the northwestern Caribbean Sea from the Pacific Ocean.

Arlene's winds strengthened to 45 kn as the storm slowly approached Cuba. The storm then weakened to a tropical depression on May 8 while crossing Cuba. Upon reaching the Bahamas, Arlene briefly regained strength as the winds increased to 50 kn. However, the storm was rapidly absorbed by an elongated trough of low pressure as it moved out to sea.

TROPICAL STORM BRET - JUNE 29-JULY 1

After a lull of almost 2 mo, tropical cyclone activity resumed with the development of Bret in late June. Bret formed as a subtropical LOW within a stationary frontal zone off the mid-Atlantic coast. As the LOW moved westward toward the coast, it developed the deep convection and tightly banded cloud structure of a tropical storm (fig. 4). Gale warnings were issued for the coast from Cape Hatteras, N.C., to Ocean City, Md., at 2200 GMT, June 30.

The DOCEBARRA (PPGH) encountered 50 kn winds at 1800, June 30, and the U.S. Navy Cruiser SPRUANCE reported 45 kn at 2300.

The INVICTUS, a 42-ft sloop, encountered 60 kn winds at 0300, June 30, approximately 300 mi east of the North Carolina coast, and close to Bret's center.

A 35-ft sloop passed through the storm center at 1400 of the same day and the captain gave the following account:

Table 2
NORTH ATLANTIC TROPICAL CYCLONES FOR PAST YEARS

TOTAL NUMBER OF TROPICAL CYCLONES, LOSS OF LIFE AND DAMAGE

Year	Total Number Tropical Cyclones* All Areas	Total Number Tropical Cyclones* Reaching U.S. Coast	Total Number Hurricanes All Areas	Total Number Hurricanes Reaching U.S. Coast	Loss of Life Total All Areas	Loss of Life United States	Damage by Categories** Total All Areas	Damage by Categories** United States
1931	8	2	2	0		0		+
1932	11	5	6	2		0		+
1933	21	7	9	5		63		7
1934	11	3	6	3		17		6
1935	6	2	5	2		414		7
	58	21	28	12				
1936	16	7	3			9		6
1937	9	4	3	3		0		+
1938	6	4	3	2		600		5
1939	5	3	1	1		3		3
1940	8	3	4	2		51		6
	46	21	20	9				
1941	6	4	4	2		10		7
1942	10	3	4	2	17	+	?	?
1943	10	4	5	3	19	1+	?	?
1944	11	4	7	3	1,058	64	8	8
1945	11	5	5	3	29	7	8	8
	48	20	25	11				
1946	6	4	3	1	5	0	?	?
1947	9	3	3	3	72	53	8	8
1948	9	4	6	3	24	3	?	?
1949	13	7	7	3	1	1	8	8
1950	13	4	11	5	37	19	?	?
	50	22	32	12				
1951	10	1	8	0	244	0	?	6
1952	7	2	6	1	16	3	6	6
1953	14	6	8	2	3	2	?	?
1954	11	4	8	3	720+	180	9	9
1955	12	5	9	3	1,316+	21+	9	9
	54	18	37	9				
1956	8	3	4	1	76	23	8	?
1957	8	0	3	1	471	390	8	8
1958	10	1	7	0	49	2	?	?
1959	11	7	7	3	37	24	?	?
1960	7	4	4	2	183	65	9	9
	44	20	25	7				
1961	11	3	8	1	340	46	8	8
1962	5	1	3	0	4	4	6	6
1963	9	1	7	1	7,218+	11	8	?
1964	12	6	6	1	286	49	9	9
1965	6	2	4	1	76	75	9	9
	43	13	28	7				
1966	11	2	7	2	1,040	54	8	?
1967	8	2	6	1	68	15	8	?
1968	8	3	5	1	11	9	?	?
1969	18	3	12	2	364	256	9	9
1970	10	3	5	1	74	11	9	9
	55	13	35	7				
1971	13	5	6	3	44	8	8	8
1972	7	3	3	1	128	121	9	9
1973	8	1	4	0	16	3	?	?
1974	11	2	4	1	3,000+	1	8	8
1975	9	1	6	1	80	23	9	9
	48	12	23	6				
1976	10	4	6	1	77	9	8	?
1977	6	1	5	1	10	0	?	?
1978	12	3	5	0	41	32	?	?
1979	9	3	7	3	1,203	22	9	9
1980	11	2	8	1	236	2	9	8
	48	14	30	6				
1981	12	2	7	0	2	0	?	?
Total	506	176	290	85				
Mean	9.9	3.5	5.7	1.7				

**The Environmental Data Service has for some time recognized that, without detailed expert appraisal of damage, all figures published are merely approximations. Since errors in dollar estimates vary in proportion of the total damage, storms are placed in categories varying from 1 to 9 as follows:

1 Less than $50
2 $50 to $500
3 $500 to $5,000
4 $5,000 to $50,000
5 $50,000 to $500,000
6 $500,000 to $5,000,000
7 $5,000,000 to $50,000,000
8 $50,000,000 to $500,000,000
9 $500,000,000 to $5,000,000,000

* Including hurricanes and after 1967 subtropical cyclones
+ Not reported in literature, believed minor.
? Additional deaths for which figures are not available.

Table 3

NORTH ATLANTIC TROPICAL CYCLONES FOR PAST YEARS

Frequency of Tropical Cyclones (Including Hurricanes) by Months and Years										
		May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931			1	1	2	3	1	1		9
1932		1			3	3	3	1		11
1933		1	1	3	7	5	3	1		21
1934		1	1	1	2	2	3	1		11
1935					3	1	2			6
1936			3	3	6	4	1			16
1937				1	2	6				9
1938					3	1	3	1		8
1939			1		1	1	2			5
1940		1			3	2	2			8
1941						4	2			6
1942					3	3	3	1		10
1943				1	2	4	3			10
1944				3	2	4	2			11
1945			1	1	4	3	2			11
1946			1	1	1	1	2			6
1947				1	2	3	3			9
1948		1		1	2	3	1	1		9
1949					3	7	2	1		13
1950					4	3	6			13
1951		1			3	4	2			10
1952	(Feb.) 1				2	2	3			7
1953		1			3	4	4	1	1	14
1954			1	1	2	4	1	1	1	11
1955				1	4	5	2			12
1956			1	1	1	4	1			8
1957			2		1	4	1			8
1958			1		4	4	1			10
1959		1	2	2	1	3	2			11
1960			1	2	1	3				7
1961				1		6	2	2		11
1962					2	2	1			5
1963				1	1	5	2			9
1964			1	1	4	4	1	1		12
1965			1		2	2	1			6
1966			1	4	1	4		1		11
1967					1	4	3			8
1968			3		1	3	1			8
1969				1	5	6	5	1		18
1970		1		1	3	3	2			10
1971				1	4	6	1	1		13
1972		1	1		2	2		1		7
1973				2	2	2	2			8
1974			1	1	4	4	1			11
1975			1	1	2	3	1		1	9
1976		1		1	5	2	1			10
1977					1	3	2			6
1978	(Jan) 1			1	4	3	3			12
1979			1	2	3	2	1			9
1980					3	5	1	2		11
1981		1	1		2	5	1	1		11
1982										
1983										
1984										
1985										
Totals	(Jan) 1 (Feb) 1	12	28	41	129	176	94	20	3	505

Frequency of Tropical Cyclones Reaching Hurricane Intensity by Months and Years									
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931					2				2
1932				3	1	1	1		6
1933		1	1	3	3	1			9
1934		1	1	1	1	1	1		6
1935				2	1	2			5
1936		1	1	3	2				7
1937					3				3
1938				2	1				3
1939				1		2			3
1940				3	1				4
1941					3	1			4
1942				3			1		4
1943			1	1	2	1			5
1944			2	1	3	1			7
1945		1		1	1	2			5
1946			1		1	1			3
1947				2	1	2			5
1948				1	3	1	1		6
1949				2	4	1			7
1950				4	3	4			11
1951	1			2	3	2			8
1952				2	2	2			6
1953				2	3	1			6
1954		1		2	3	1		1	8
1955				3	5	1			9
1956			1	1	1	1			4
1957		1			2				3
1958				3	3	1			7
1959		1	2		3	1			7
1960			1	1	2				4
1961			1		5	1	1		8
1962				1	1	1			3
1963			1	1	4	1			7
1964				2	3	1			6
1965				2	1	1			4
1966		1	3	1	1		1		7
1967				1	3	2			6
1968		2		1	1	1			5
1969				4	4	3	1		12
1970	1			1	1	2			5
1971				2	4				6
1972		1		1	1				3
1973			1	1	1	1			4
1974				2	2				4
1975			1	2	3				6
1976				4	1	1			6
1977				1	3	1			5
1978				2	2	1			5
1979			1	2	2				5
1980				3	3	1	2		
1981				1	5	1	1		
1982									
1983									
1984									
1985									
Totals	2	11	19	84	114	50	10	1	291

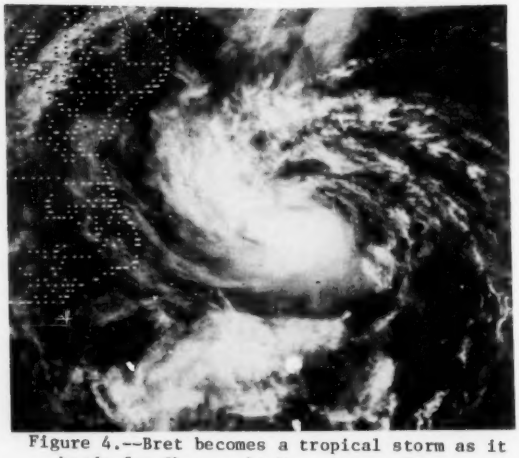

Figure 4.--Bret becomes a tropical storm as it heads for Chesapeake Bay on June 30.

"We entered the eye of Bret at 1400 GMT and remained there for aapproximately 25 minutes. Our barometer reading was 29.53 inches (1000 millibars). Two large seas were running...one from the north and one from the east/northeast at 15 to 25 feet. The waves were very steep and oftentimes the sloop would hang on the edge of a wave with the forward section, up to the mast, totally free of water, with a sheer drop to the bottom of the trough. The wind shifted from north to south after the eye passed, making confusion of the wave trains."

Bret weakened to a tropical depression as it crossed Chesapeake Bay on July 1. The dying system spread 4-in rains westward to the Ohio Valley, and a tornado was reported at Virginia Beach, VA.

TROPICAL STORM CINDY - AUGUST 2-5

A month elapsed between the development of Bret and Cindy. As was the case with Bret, Cindy developed from a subtropical system off the mid-Atlantic coast. Cindy was a minor storm throughout her life both in size and strength. Highest

winds reached 50 kn on August 4, but the central pressure never fell below 1002 mb. The storm accelerated northeastward on August 5, losing tropical characteristics and weakening, as it passed well to the southeast of Newfoundland.

Cindy is one of a number of similar storms that have been observed to develop north of the subtropical ridge in recent years. Prior to the era of continuous satellite surveillance, many such storms were probably not classified as tropical systems. The formation process is initially subtropical, and the transition to a tropical storm is indicated by the evolution of the cloud pattern into the characteristic tropical cyclone structure as observed on satellite images. The tropical cyclone stage may last for only a brief period before the influence of the cold environment destroys the deep convection.

HURRICANE DENNIS - AUGUST 7-21

Dennis became a tropical storm over the eastern Atlantic on August 8. Some of the most intense hurricanes of record have developed in that region during August. Satellite photos on the 8th show that Dennis had a well-developed cloud structure (fig.5) and it seemed likely that it would soon become a hurricane. However, as the storm approached the Caribbean it encountered strong westerly winds aloft which disrupted the circulation, and Dennis weakened to a tropical depression and finally to a disorganized disturbance.

As the system turned northward across Cuba and toward Florida it became a tropical storm once again. Heavy rains deluged the extreme southeastern part of the state with accumulations up to 20 in, as the storm moved slowly up the Florida peninsula. Flood damage was estimated at $25 million.

On August 19 the storm moved out over the Atlantic near Cape Canaveral, skirted the coast of the Carolinas, and then turned eastward. Dennis briefly acquired hurricane strength over the warm Gulf Stream before becoming extratropical over colder waters late on August 21.

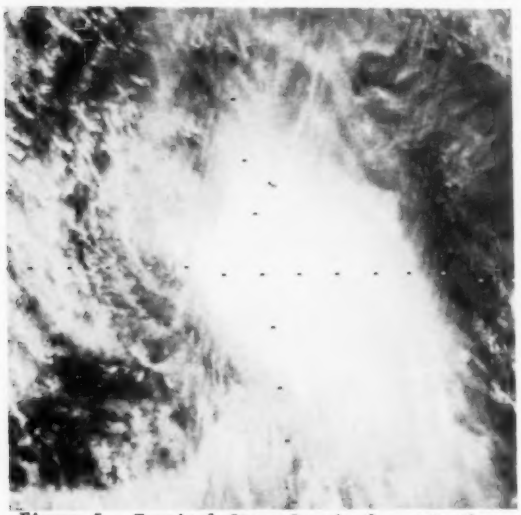

Figure 5.--Tropical Storm Dennis forms in the hurricane-breeding zone of the eastern tropical Atlantic on August 8.

HURRICANES EMILY (AUGUST 31-SEPTEMBER 11), FLOYD (SEPTEMBER 3-12), GERT (SEPTEMBER 7-15), HARVEY (SEPTEMBER 11-19), AND IRENE (SEPTEMBER 21-OCTOBER 3)

On only two previous occasions in the past 100 yr, 1893 and 1955, have five hurricanes formed in 1 mo. For the second consecutive year the fifth, sixth and seventh storms have co-existed on the same day - September 8 (fig. 6).

Emily began as a subtropical storm between Florida and Bermuda on August 31 but evolved into a tropical storm on September 1. Emily's path was blocked by a large high-pressure area to the north and the storm followed a slow, erratic, northeastward track, at one point tracing a counterclockwise loop. The combination of Emily and the large HIGH to the north produced large swells over the western Atlantic and caused high tides and beach erosion along the northeast and middle Atlantic coastline of the United States.

The next four hurricanes, Floyd, Gert, Harvey and Irene, all formed from tropical disturbances

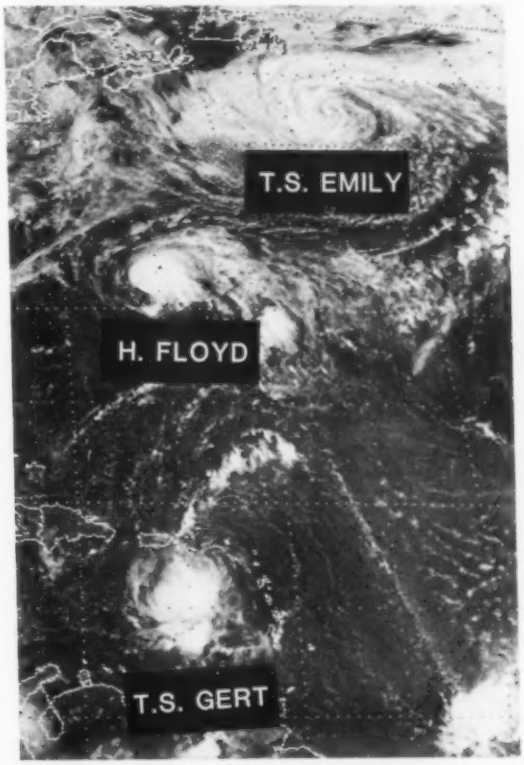

Figure 6.--Tropical Storms Emily and Gert and Hurricane Floyd on September 8.

and followed recurving tracks through the western Atlantic. The track of each storm was influenced to some extent by the trough left in the wake of the hurricane that preceded it.

Gert passed over the southern Leeward Islands, Puerto Rico and the eastern Bahamas while still a tropical storm and caused rains of up to 6 in. Floyd also produced heavy rains over the Leewards. Floyd and Gert, as well as Emily, briefly threatened Bermuda.

Floyd, Harvey and Irene were the strongest storms of the year, with winds reaching 100 kn or more. Of these, Harvey was the most intense with winds of 115 kn (fig. 7). A French ship, the CAVALIER DE LA SALLE (FNIC), passed near the center of Hurricane Harvey during August 16-17. At 1200, August 16, the ship reported east-northeasterly winds of 65 kn to the north of the center. Six hours later it experienced east winds of 45 kn slightly to the east of its previous location. No reports were received for the next 12 hr but at 1200, August 17, the ship's winds had shifted to westerly at 45 kn as the ship travelled about 100 mi to the southeast. Examination of the track of Harvey and the path of the ship suggests that the CAVALIER DE LA SALLE must have passed close to the eye of the hurricane, which at the time had maximum winds of about 90 kn.

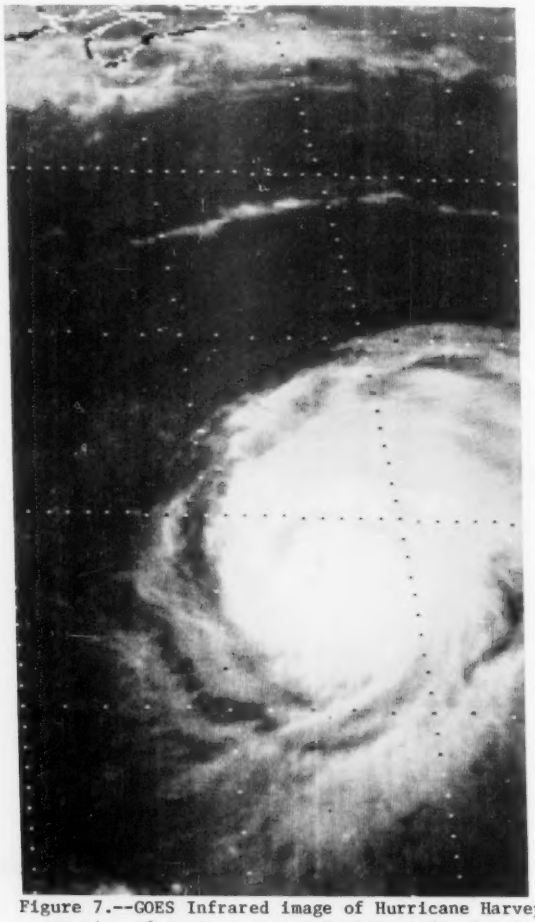

Figure 7.--GOES Infrared image of Hurricane Harvey at time of maximum strength with winds of 115 kn, 0300 GMT, September 15.

The most remarkable feature of Hurricane Irene, the last of the series, was its persistence. After losing tropical characteristics on September 2, the storm headed eastward toward Europe. On September 4 it crossed into France as a large extratropical low-pressure system.

TROPICAL STORM JOSE - OCTOBER 29-NOVEMBER 1

Jose developed in an unusual manner from a North Atlantic low-pressure system which moved southward through the central Atlantic during the last week of October. Eventually a cloud circulation center appeared on satellite photos and the system met the criteria for classification as a tropical storm. The tropical storm reversed the course of the earlier LOW, and headed northward through the data-void expanses of the central Atlantic. It accelerated to a forward speed of 40 kn before losing identity west of the western Azores on November 1.

HURRICANE KATRINA - NOVEMBER 3-7

The first and last tropical storms of the year both formed in the northwest Caribbean Sea and moved across eastern Cuba and the Bahamas before weakening in the southwest North Atlantic.

Katrina began as a tropical depression centered about 150 mi southwest of Grand Cayman on November 3. As it curved northeastward toward Cuba, it strengthened to a tropical storm and briefly became a hurricane. On November 5 a reconnaissance flight reported a sea-level pressure of 980 mb and

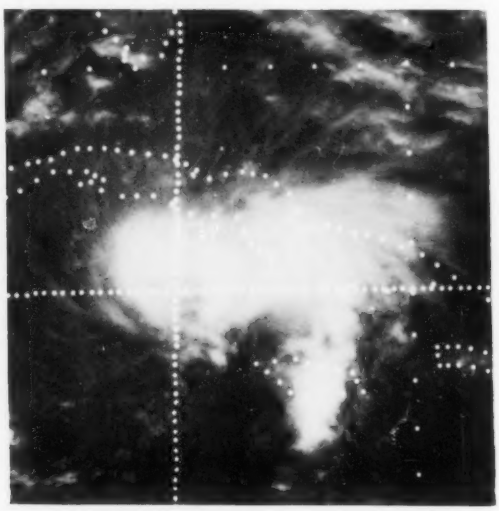

Figure 8.-- Katrina lashes the eastern half of Cuba.

Table 4.--Ships encountering tropical cyclone winds of 50 knots or more in the North Atlantic during 1981

Call	Vessel Name	Nationality	Date Mo.	Date Day	Time GMT	Ship Position Lat. °N	Ship Position Long. °W	Wind Dir. 10°	Wind Speed (kn)	Pressure (mb)	Sea Waves Period (sec)	Sea Waves Height (m)	Sea Swells Dir. 10°	Sea Swells Period (sec)	Sea Swells Height (m)
ARLENE (None)															
BRET															
	INVICTUS	American	06	30	03	35.8	70.1	--	60						
PPGH	DOCEBARRA	Brazil	06	30	18	35.0	73.9	36	50	1014.0					
CINDY (None)															
DENNIS															
KYVN	ARECIBO	American	07	21	00	37.8	70.4	04	50	1007.3	8	5	07	8	5
4XSX	HAR CARMEL	Israel	07	21	06	37.0	71.9	07	55	1007.0	7	5			
EMILY															
LSDY			09	03	08	35.7	66.0	01	50	1001.0					
DDGR			09	08	12	40.5	55.0	21	55	994.6					
DHES			09	08	18	42.8	53.0	20	50	995.0					
FLOYD (None)															
GERT (None)															
HARVEY															
FNDR			09	12	23	19.6	58.3	14	55	996.0					
FNIC	CAVELIER DE LA SALLE	FR.	09	16	12	36.8	56.6	07	65	1011.0	6	2	16	11	2
KSDF			09	16	12	35.7	57.5	05	55	998.0					
IRENE															
SGLM	WINTER STAR	Swiss	09	27	21	23.0	56.9	26	50	999.5	5	4	36	10	10
"	" "	"	09	28	00	23.6	56.0	17	50	1001.4					
ELAP			09	28	12	22.2	54.6	14	65	999.8	99	14	14	13	10
"			09	28	18	22.1	54.6	17	65	986.7	99	14	18	14	11
"			09	29	00	22.1	54.5	23	60	1010.6	99	14	23	14	10
VTLX			09	29	18	34.5	47.2	13	50	998.7	7	4			
"			09	30	00	34.0	47.0	23	70	991.7	8	5			
LICX	HOEGH CAIRN	Norway	10	01	00	39.3	35.1	25	50	998.0					
JOSE (None)															
KATRINA															
Ship			11	07	00	22.1	74.4	32	50	1005.8	4	5	25	7	5

estimated surface winds of 50 kn. However, Katrina weakened to a tropical storm before crossing Cuba, where news sources reported heavy flood-induced agricultural losses and two fatalities - the only storm-related deaths of the season (fig. 8).

Katrina moved northeastward through the Bahamas before merging with a frontal system on November 6.

SUBTROPICAL STORM - NOVEMBER 12-17

The season ended with a subtropical storm which formed off northern Florida along the remnants of a cold front. Ship reports indicated that a 1004 mb LOW with 45 kn winds had developed 400 mi east of Jacksonville on November 12.

The low moved on a meandering course paralleling the east coast of the United States. For a time the storm posed a threat to the Northeast as its northward course became partially blocked by a high pressure ridge while the storm strengthened to 60 kn and the central pressure fell to 978 mb. Gale warnings were issued from Cape Hatteras, N.C., to Eastport Me. However, the storm remained offshore. The slow moving storm caused coastal flooding and beach erosion along much of the Atlantic Seaboard from north Florida to Maine.

Hints to the Observer

Robert G. Quayle
National Climatic Center
Asheville, N.C. 28801

BUOY MEASURED MEAN WAVE HEIGHTS

Climatological time series and long-term monthly mean wave height graphs based on three-hourly data for the U.S. Pacific Meteorological Buoys. Similar summaries for other elements and for the Atlantic and Gulf buoys are being prepared.

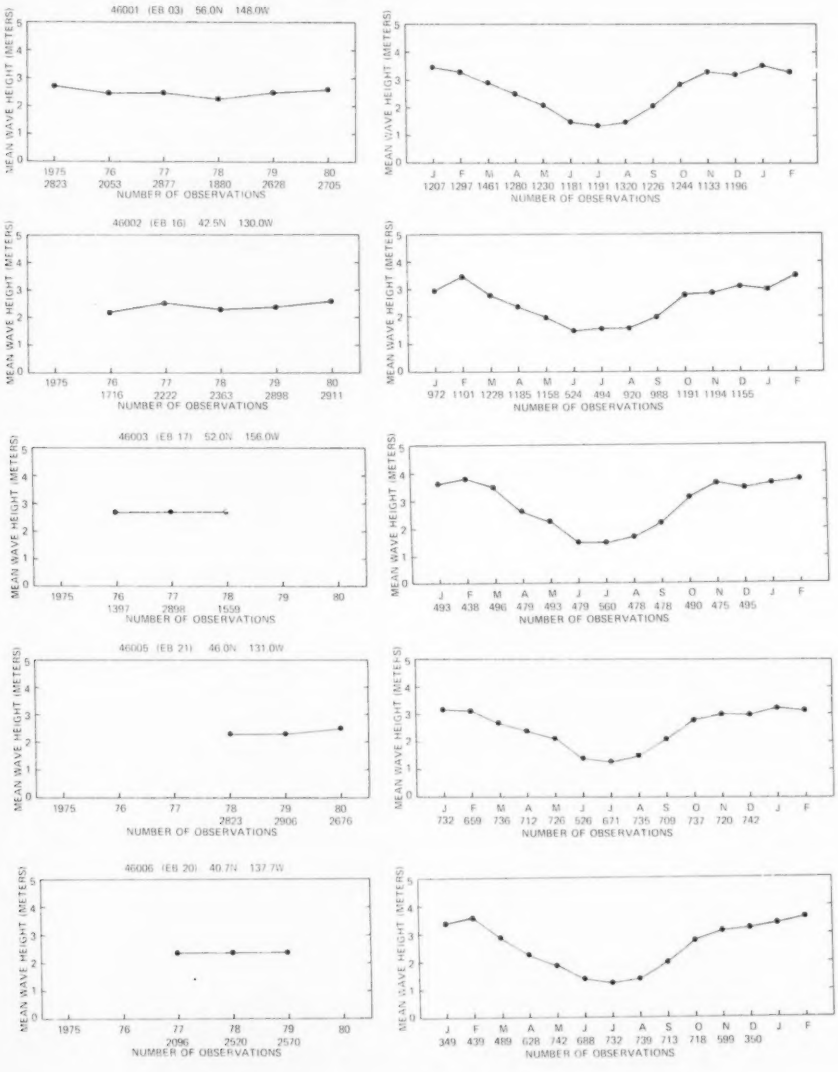

Figure 9.--Mean wave heights for selected North Pacific buoys by year and month.

Tips to the Radio Officer

Larry Murphy
National Weather Service, NOAA
Silver Spring, Md.

COASTAL STATIONS ACCEPTING SHIP'S WEATHER AND OCEANOGRAPHIC OBSERVATIONS

A new edition of "Coastal Stations Accepting Ship's Weather and Oceanographic Observations should be in your hands soon. The new edition is a complete revision of the publication. The format was designed with you, the user, in mind. Once you get the manual and have had a chance to use it we would very much appreciate your comments on it.

CORRECTIONS TO WORLDWIDE MARINE WEATHER BROADCASTS (JUNE 1981 EDITION)

Page 8

Delete the following stations:
1-0105 ST. LAWRENCE, NFLD, CANADA -- VCP
1-0170 AMAGANSETT, N.Y. -- WSL

Add the following new stations:
1-0511 MARIENHAMN, FINLAND -- OHM
Area: Northern Baltic Sea and Sea of Bothnia
0855, 1855 433 F,W

1-0512 VAASA, FINLAND -- OHX
Area: Sea and Bay of Bothnia
0850, 1850 474 F,W

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1-0770 PT. REYES, CALIF. -- NMC
On line 5 of schedule delete times and substitute 0500, 1600.

1-0780 SAN FRANCISCO, CALIF. -- KFS
In frequency column change 8444.5 to 8713.7 and 17184.8 to 17184.3.

Insert the following new station:
1-0800 LONG BEACH, CALIF. -- NMQ*
Area: North Pacific east of 160°E and Coastal Waters areas 5 and 6.
0300, 1700 472 W,S,F
*Remotely keyed by NMC

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1-0920 ASTORIA, ORE. -- NMW
Change times to 0400 and 1830 and add footnote:
Remotely keyed by NMC.

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2-0020 OCEAN GATE, N.J. -- WOO
Change schedule to read:

0015, 1215	2558(A3H)	F,W
1200, 2000	4385.3(A3A,J)	F,W
	8796.4(A3A,J)	
	13128.7(A3A,J)	
	17325.9(A3A,J)	
	22608.4(A3A,J)	
1300, 2100	4388.4(A3A,J)	F,W
	8762.3(A3A,J)	
	13131.8(A3A,J)	
	17245.3(A3A,J)	
	22623.9(A3A,J)	
1400, 2200	4403.9(A3A,J)	F,W
	8740.6(A3A,J)	
	13184.5(A3A,J)	
	17291.8(A3A,J)	
	22596(A3A,J)	
1500, 2300	4422.5(A3A,J)	F,W
	8749.9(A3A,J)	
	13107(A3A,J)	
	17310.4(A3A,J)	
	22704.5(A3A,J)	

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2-0120 SYDNEY, N.S. CANADA -- VCO
Change schedule to read:

0040, 0310, 1650, 2150	2598(A3H)	S,F
Continuous	161.65MHz (F3)	S,F

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2-0230 SAINT JOHN, N.B., CANADA -- VAR
On last line of schedule change 1540, 2120 to read Continuous.

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2-0730 ILFRACOMBE, ENGLAND -- GIL
Change schedule to read:

0833, 2033	2670(A3)	F[12]
	160.85(F3)	
0303, 0903, 1503, 2103	do.	W[2]

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2-0800 ROGALAND, NORWAY -- LGQ
Change schedule to read:

1205, 1215	6915(A3H)[1]	F
2305, 2315	9980(A3H)	
	13980(A3H)[2]	
On request	1729(A3H)	F,W
	2695(A3H)	

[1] October 1 - March 31
[2] April 1 - September 30

Add new station:
2-0895 VAASA, FINLAND -- OFW
Area: Sea and Gulf of Bothnia
0933, 1733 1862(A3H,J) F,W
2803(A3H,J)

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2-1170 SAN FRANCISCO, CALIF., U.S.A. -- KMI
Add footnote reference to frequencies 13187.6 and 17236.
Delete lines 7 through 12 of schedule.
Add footnote: Not used at 1500.

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2-1390 PORT ANGELES, WASH., U.S.A. -- NOW
Change schedule to read:

0615, 1815	2670(A3J) 157.1MHz(F3)	S,F,W

2-1410 SEATTLE, WASH., U.S.A. -- NMW43
Delete 1703 and replace with 0630, 1830.

2-1420 ASTORIA, ORE., U.S.A. -- NMW
Change schedule to read:

0533, 1733	2670(A3J) 157.1MHz(F3)	S,F,LR

2-1451 COOS BAY, ORE., U.S.A. -- NOE
Change schedule to read:

0603, 1803	2670	F
0603, 1803	157.1MHz(F3)	W

2-1470 HUMBOLDT BAY, CALIF., U.S.A. --NMC11
Change 1545 to 1615 and add new line:

0303, 1503	2670	S,F.

2-1481 MONTEREY, CALIF., U.S.A. -- NMC6
Change 1545 to 1615 and add new line:

0333, 1533	2670	S,F.

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2-1720 PORT ELIZABETH, SOUTH AFRICA -- ZSQ7
Change schedule to read:

0920, 0933, 1720	161.85(F3)	F,W
0933, 1720	1765(A3H)	F,W
1320, 1340	161.85(F3)	LR,W
1340	1765(A3H)	LR,W

2-1770 KUWAIT -- 9KK
Change 2200(A3) to 2750 (A3H).

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3-0090 NORTHWOOD, UNITED KINGDOM -- GYA, GYJ,GZZ
Change frequency listing to read:

2813.85	30 Sept-31 Mar 1630-0730
3436.85	1 Apr-29 Sept 1930-0400 30 Sept-31 Mar 1530-0830
4247.85	0000-2400
6436.35	0000-2400
8494.85	0000-2400
12741.85	1 Apr-29 Sept 0000-2400
15938.85	30 Sept-31 Mar 0830-1530

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3-0220 ROME, ITALY -- IMB
Make all frequencies (0000-2400).
On line 3 of schedule add 2250.

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Add new station:
3-0285 BRASILIA, BRAZIL -- PPN
Area: Area outlined by 15°N, 85°W; 15°N, 10°W; 35°S, 10°W; 35°S, 85°W
Frequency (kHz): 10225, 18080

1600	Nephanalyses
1620	Significant Weather Prognosis

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3-0305 ESQUIMALT, BRITISH COLUMBIA
Change schedule to read:

0340, 1545, 2130	Surface analysis
0325, 1530 2115	24Hr surface prognosis
2200	24Hr wave prognosis
2215	24Hr weather depiction (Sat. and Sun.)
2215	Schedule (Mon., Wed. and Thur.)
2215	Sea surface temperature (Tue. and Fri.)

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3-0460 NAIROBI, KENYA (5YE)
Add frequencies 10115 and 22867.

Page 70

4-0040 MOBILE, ALABAMA, U.S.A. -- WLO
Change frequency 13073.5 to 13083.5 and 17209.5 to 17199.5.

Marine Observations Program

J.W. Nickerson
National Weather Service, NOAA
Silver Spring, MD

NECESSITY OF SHIP'S OBSERVATIONS

Whenever Port Meteorological Offices (PMO) and mariners sit down with a cup of coffee and talk, several questions always seem to come up. The first one usually is, "Is the weather report from my ship really important?"

I wish every mariner could visit a weather forecast office and see the continuous hectic pace to collect data, plot it, compare various sources such as the surface weather maps, upper air maps, all the computer products, and satellite pictures to make the decisions necessary to issue a forecast. You would realize by looking over the forecaster's shoulder how important a single ship observation can be. Let me summarize a recent report from the NWS Forecast Office at Anchorage, Alaska:

The strongest storm of the year hit the Gulf of Alaska on December 16, 1981. The storm developed over the western Pacific and moved eastward as a strong low along latitude 40°N, south of the Aleutians. The central pressure was 945 mb on December 17. Storm-force winds with gusts in excess of 70 knots spread throughout the Gulf of Alaska.

On December 15 the computer models accurately forecast the storm track, and on December 16, they indicated that the central pressure should increase with the winds decreasing. Based on the computer data, storm warnings were reduced to gale warnings by the Anchorage forecasters at 2345 December 15.

Shortly thereafter, the ship reports started coming in for the 0000 December 16, surface chart and the analysis was commenced immediately. Two ships, the Shunwind, a Liberian bulk carrier, and the Shinamo Maru, a Japanese ore carrier, made weather reports from very close to the center of the storm. These ship reports indicated that the central pressure was at least 11 mb lower than the 12-hour computer forecast had indicated. The marine forecast was immediately revised and upgraded to a storm warning for the Gulf of Alaska. As the report says, "Without the two ship observations near the LOW center, the lead time would have been cut several hours giving mariners little or no time to prepare from storm-force winds in excess of 70 knots."

Always send a weather report whenever you can, fair weather or foul. Until the weather map is analyzed there is no way to tell how important a single ship report will be. Check with your radio officer for his watch schedule so you can get a weather report off before he goes off watch even if it isn't at the synoptic time. The forecaster has no trouble at all adjusting for late or early observations. Of course, the computer can't use observations off the synoptic time, but the computer only provides information. The forecaster is the person who makes the decisions and the forecasts.

Just because you can see the coast, doesn't mean the forecaster knows what kind of weather you are experiencing. If you can, report weather at least to the sea buoy. We know how much busier the watch becomes on approaching port, but even the basic observation groups would be of great assistance.

Coastal shipping should consider that they are usually in a different weather regime than a land weather observing station. Differences between land and water temperature and terrain roughness cause changes in wind direction and speed. In most cases, the changes usually mean higher winds offshore, sometimes quite a bit higher. Occasionally, the change in wind direction and speed near shore are the first indications of rapid storm development offshore. Yes, every observation is really important.

In future articles, we'll discuss proper weather instrument exposure, how to use sea water temperature measurement aboard ship, and SITOR, an improved CW radio system.

*Editor's Note:

In an article entitled "The Fastnet storm--a forecasters viewpoint" by A. Woodroffe published in Volume 110, October 1981 of The Meteorological Magazine, the last sentence of the Conclusions is quoted. "This case-study clearly demonstrates the vital importance of reliable and correctly coded ship observations, even in this era of computers and satellite data."

CORRECTION TO NEW MARINE CODE

The paragraph on temperatures on page 392 of the November-December 1981 issue contained an error in defining s_n. The symbol s_n should be zero (0) for temperatures 0°C and above; it is coded one (1) for minus temperatures. The part of the sentence in parenthesis should read: (0 or plus is coded 0, minus is coded 1).

The Editor's Desk

WORST WINTER WEATHER DEPENDS ON POINT OF VIEW

Just as certain as the forthcoming arrival of winter is the resumption of nationwide disputes about winter weather.

Annually, weather buffs, as well as many other U.S. residents, join in disagreement as to whose part of the country has the worst weather, the coldest temperatures, the heaviest snowfall, or what-have-you. And even the voluminous archives of the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) can't settle the question with any real degree of finality.

The fact of the matter is, determining what area has the worst weather depends largely on how you measure it. Coldest day? Longest cold spell? Heaviest snowfall? Greatest amount of snow within a given time period? Extent of property damage? The only sure thing appears to be the dispute never will be settled definitively.

For example: January 1979 had the coldest monthly average temperature for the nation as a whole on record, 22.8°Fahrenheit. Snow and ice cover in the U.S. was more extensive than ever previously experienced, at least since people began keeping records of such things.

That cuts no ice with folks who were living in Amenia, N.D., during the winter of 1936, however. Not only was the statewide mean temperature in February of that year a shivering -13.1° -- the state's coldest month on record; for 47 consecutive days the temperature in Amenia didn't rise above zero, except for a few hours on Jan. 30 when it nudged up to one above.

A record cold? Not if you lived in Parshall, N.D., that same winter. On Feb. 15, 1936, temperatures there dropped to -60°; still the state's record coldest day.

But is one really cold day, or are 47 days when the temperature didn't get above zero, as bad as eight days during one month when the temperature never was higher than -15°? That's what happened in Fort Snelling, Minn., in March, 1843, ending a 60-day period when the temperature never was above freezing.

Try telling Eastern Massachusetts residents that frigid temperatures make for the worst winter weather, however. They'll come right back with statistics about the blizzard of the century for their area, in early February, 1978. Heavy snowfall with northeasterly winds exceeding 125 miles an hour, and severe coastal flooding. More than 1,000 coastal homes flooded, 23,500 persons evacuated to temporary shelters, and a one-week ban on all traffic. Now that's winter weather!

Unless you happen to live in Buffalo, and everyone knows what kind of weather blows in off Lake Erie.

Isn't it at least possible to state unequivocally that the northern Great Plains had worse winter weather than anywhere else in the U.S.? Only maybe. What about the Blizzard of '88 when Washington, Philadelphia, New York and Boston all were cut off and immobilized; drifts 30 to 40 feet deep covered houses in New York state and southern New England, and hundreds of towns literally were buried in snow from Maine to Maryland?

Statisticians working with weather records maintained at NOAA's National Climatic Center in Asheville, N.C., refuse to be drawn into the controversy. But they do provide specifics you could use to tip an argument one way or the other.

To wit: the lowest temperature ever recorded in the U.S. was -78°F, observed at Prospect Creek Camp in the Endicott Mountains of Alaska on Jan. 23, 1971. In the lower 48 states, Rogers Pass -- 148 feet below the summit of the Continental Divide in Montana -- experienced -69.7° on Jan. 20, 1954.

The lowest annual normal temperature for the 48 states is 29.6°, at Mount Washington, N.H., a peak notorious for its sudden and dangerous changes in weather, on which hikers have died of exposure in the middle of summer. The lowest winter normal temperatures are in northwestern Minnesota (5.3°), and Langdon Experimental Farm in northeastern North Dakota (5.6°).

SENIOR NASA OFFICIAL NAMED NOAA DEPUTY

Dr. Anthony J. Calio, a nuclear physicist and former NASA associate administrator, today was sworn in as deputy administrator of NOAA.

The ceremony was conducted by Dr. John V. Byrne, administrator of the Commerce Department agency, following Calio's congressional confirmation last Wednesday.

A native of Philadelphia, Calio was with the American Machine and Foundry Company in Alexandria, Va., and the Westinghouse Atomic Power Division in Pittsburgh, Pa., before joining NASA in 1963.

During his 18 years with the space agency, he held a number of senior positions most recently serving as the acting deputy administrator. As the associate administrator for Space and Terrestrial Applications, he was responsible for planning and directing NASA's program to identify, demonstrate and develop practical applications on earth of satellite-derived data.

As director of Science and Applications at NASA's Johnson Space Center during 1968-75, he was involved in both the Apollo and Skylab programs; and earlier, as chief, Systems Integration and Coordination at NASA headquarters, he was responsible for developing the Apollo Lunar Science Program and its associated flight hardware.

At NOAA, Calio will be involved in the general management of all the agency's activities, including its operational remote sensing satellite programs, atmospheric and oceanographic research, fisheries management, and climate analysis and forecasting.

Calio is a fellow of the American Institute of Aeronautics and Astronautics and the American Astronautical Society, as well as a member of the American Association for the Advancement of

Science and the American Geophysical Union. He has received numerous honors, including NASA's Distinguished Service, Exceptional Scientific Achievement, and Exceptional Service medals.

OCEANOGRAPHIC ANALYSES

Beginning February 22, 1982, oceanographic analyses will be available via automatic telecopier. If you previously have been receiving the charts via manual telecopier, you must now call the telecopier number (301-763-8333 commercial or 763-8333 FTS) during specified time periods. If you are now receiving the charts by mail only, they will continue to be mailed to you. However, you may also receive them by accessing the telecopier.

The analyses will be transmitted on the schedule shown in table 5. Examples of the analyses are shown in figures 10 to14. The Northeast Atlantic Oceanographic Analysis is prepared on Mondays, Wednesdays, and Fridays. The Southeast Atlantic & Gulf of Mexico charts are reanalyzed on Tuesdays and Thursdays.

If a full time automatic telecopier interests you or if you have any comments, requests, or suggestions please contact Jenifer Wartha Clark at 301-763-8444.

If you are not familiar with automatic telecopy procedures, you can obtain these charts by doing the following:

(1) Set your telecopy machine on 6 min, not 4 min.

(2) Set your telecopy machine on receive, not send.

(3) Dial 301-763-8333 Commercial or 763-8333 (FTS) during the specified time periods outlined.

(4) When the tone sounds, place your telephone receiver into the machine.

(5) If our number is busy, keep calling.

Table 5.--The weekly schedule of times the oceano graphic charts will be transmitted.

Time e.s.t.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
9:30-11:30 a.m.	Previous Friday's expanded Northeast Atlantic	Monday's expanded Northeast Atlantic	Tuesday's expanded Southeast Atlantic	Wednesday's expanded Northeast Atlantic	Thursday's expanded Southeast Atlantic	Friday's Northeast Atlantic	Friday's Northeast Atlantic
12:00-1:00 p.m.	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis	Sea Surface Thermal Analysis
5:00-7:00 p.m.	Northeast Atlantic	Southeast Atlantic & Gulf of Mexico	Northeast Atlantic	Southeast Atlantic & Gulf of Mexico	Northeast Atlantic	Friday's Northeast Atlantic	Friday's Northeast Atlantic

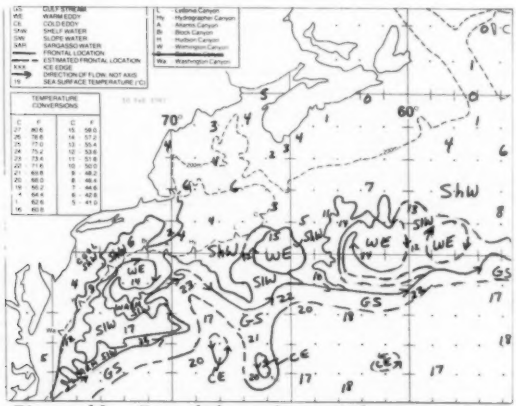


Figure 10.--Expanded northeast Atlantic analysis.

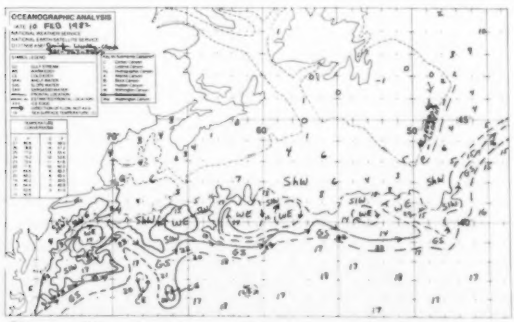


Figure 11.--Northeast Atlantic analysis.

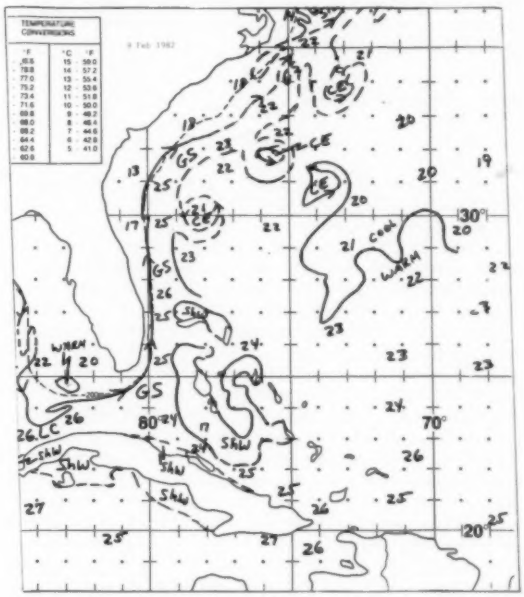


Figure 12.--Expanded southeast Atlantic analysis.

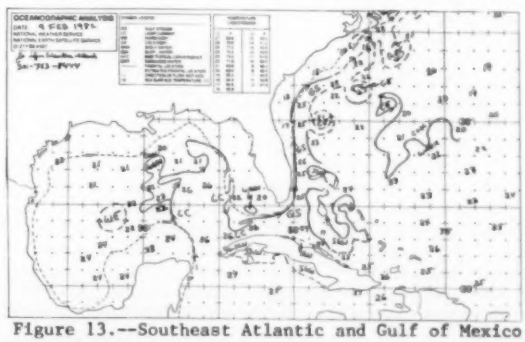


Figure 13.--Southeast Atlantic and Gulf of Mexico analysis.

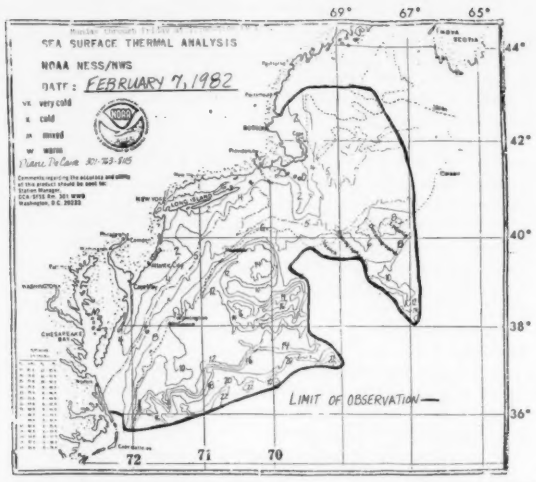


Figure 14.--Northeast Atlantic sea-surface thermal analysis.

MARAD TRANSFERS RADAR SCHOOL TO SEAMEN'S CHURCH INSTITUTE

The U.S. Maritime Administration (MarAd) will transfer its Eastern Region Collision Avoidance Radar Navigation School to the Seamen's Church Institute of New York and New Jersey.

The transfer agreement will become effective when the U.S. Coast Guard certifies the Institute as an approved operator of the radar school qualifying students for Coast Guard issuance or renewal of Radar Observer endorsements.

The school, originally located in the Maritime Administration's Eastern Region facilities, was moved in 1968, to the Institute and operated by MarAd under a service agreement. It is one of five such training centers established under a training program that was begun in 1947. Over the past 5 years, the New York school has provided radar instruction to some 4,000 persons.

Under terms of the transfer agreement, MarAd will conditionally transfer the school's equipment and responsibility for its maintenance and operation to the Institute, at 15 State Street in Manhattan, and will provide $40,000 to assist in meeting expenses for the first year. The condition is that the institute offer a reasonable number and mixture of radar courses for 36 consecutive months after the agreement becomes effective. When that commitment is met, the Institute will receive full title to MarAd's equipment, including two marine radar units utilizing electronically simulated visual displays.

The comprehensive collision avoidance radar training to be offered will complement the education program of the Institute, which has provided training courses to seafarers since 1916 and has been serving merchant seamen of all nations since 1834.

The Institute's present courses include LORAN and gyrocompass instruction which has been funded under a separate MarAd contract since Sept. 3, 1977. That agreement will remain in place through Sept. 30, 1982, when it will expire by its own terms.

Under MarAd's operation, the school has offered courses of from one to eight days to prepare officer candidates and licensed deck officers for original qualifications as Radar observer, or for renewal of Radar observer endorsements on their U.S. merchant marine deck officer licenses.

The agency operates other radar schools in Toledo, Ohio; New Orleans, La.; San Francisco, Calif.; and Seattle, Wash.

COAST GUARD TO CONSOLIDATE, STREAMLINE SOME OPERATIONS

Coast Guard Commandant John B. Hayes announced plans to consolidate some Coast Guard operations and streamline others, in support of greater efficiency in Federal spending, and in accordance with Congressional appropriations levels.

A number of functions have been identified that can be consolidated, centralized or transferred, without compromising essential Coast Guard services. Many of these management actions will result in more efficient operations, according to Admiral Hayes.

Eleven of the Coast Guard's older and less efficient cutters will be decommissioned as a part of the realignment program.

All recruit training will be conducted at Cape May, NJ, permitting the closing of the West Coast training center at Alameda, CA.

Coast Guard air stations located in Los Angeles, CA, Savannah, GA and Aguadilla, PR, will be discontinued. The search and rescue responsibilities formerly handled by these stations will be provided by the other units.

Through computerization, functions formerly conducted at 105 separate offices are being centralized in 12 regional offices with each central office located at a major port to serve the demand for documentation services.

The cutters slated for decommissioning are the BITT in Alaska, CLOVER and WALNUT in California, EVERGREEN in Connecticut, HOLLYLOCK in Florida, BIBB in Massachusetts, MACKINAW in Michigan, CITRUS in Oregon, INGHAM in Virginia, and FIR and CAMPBELL in Washington.

The actions being taken are designed to reduce the fixed overhead costs of operating shore installations.

The Coast Guard anticipates that many of the personnel reductions that may be required can be accomplished through attrition.

COLD WATER DROWNING VICTIMS MAY NOT BE DEAD, A REMINDER

A natural human reflex similar to that found in some marine mammals can be useful in saving many winter drowning victims, if rescuers are aware of it, in a reminder distributed by NOAA.

The reflex has allowed some drowning victims submerged in cold water for up to half an hour to respond to aggressive, prolonged resuscitation efforts. In those instances the closed chest massage and mouth-to-mouth breathing were begun

immediately after recovery of the victims' bodies, and continued without let-up for several hours.

Identified several years ago through NOAA-funded research, the reflex is particularly strong in children under 3 1/2, becoming less active through the teen years.

As a result of the research, NOAA officials have urged rescue workers and others not to give up apparent drowning victims for dead, and the American Red Cross has revised its procedures concerning emergency treatment in those drowning cases where water temperature is below 70°F.

Termed the "mammalian diving reflex," the response is stimulated by submersion in water with a temperature below 70°F. This halts the breathing of a drowning victim and redistributes oxygen-carrying blood from non-vital tissues to the heart, lung and brain. The cold water causes the body to require less oxygen, while the mammalian reflex diverts the existing oxygen supply within the body to those organs which require it most for survival.

The research finding contradicts a long-held belief that anyone submerged longer than 4 min would, at the very least, suffer irreparable brain damage, if not death.

In 25 cases where immediate, prolonged resuscitation was given victims submerged in cold water longer than 5 1/2 min, 20 recovered fully with no evidence of brain damage. Three did not respond to resuscitation, and two victims' lives were saved but they suffered physical damage.

Among the cases were one involving a 2-year-old child whose mother refused to accept the fact the toddler was dead and gave resuscitation for an extended period, and another dealing with an 18-year-old college student submerged in a frozen pond for 38 min. Even though both these victims had inhaled water, were blue, not breathing, and showed every sign of being dead, both recovered after resuscitation and hospital care, with neither giving any indication of damage to the brain.

The mammalian diving reflex was observed some years ago in seals, whales and other air-breathing aquatic mammals. It permits these mammals to stay underwater for as long as half an hour without any adverse effect.

SUBSURFACE TEMPERATURE DATA FROM THE GREAT LAKES

This interesting article is reprinted from the NOAA Data Buoy Office's Ocean Engineering Technical Bulletin and was written by J.A. Albrecht.

Two moored buoys, with attached thermistor lines for measuring subsurface temperatures (Tz) at eight levels and pressure at two levels, were deployed in the Great Lakes this past summer. On June 19, 1981, one buoy was deployed at Station 45006 in Western Lake Superior, 47.3°N latitude and 90.0°W longitude. The other buoy was deployed at Station 45007 in the center of Southern Lake Michigan, 42.7°N latitude and 87.1°W longitude on July 17, 1981. A significant amount of Tz data, particularly at Station 45006, was obtained prior to retrieval of the buoys in November. On Station 45007 the pressure sensor at the 11-m depth failed in July, and the thermistors at 16-, 21-, and 26-m depths failed in September. On Station 45006, the pressure sensor at the 51-m depth failed in July. All other sensors in the line functioned until October 1, 1981, at which time a large autumn storm moved through the upper Great Lakes damaging the system.

Analyses of the data for Station 45006 are available for the period June 23, 1981, through October 1, 1981. The data were analyzed on time series of temperature versus depth, as shown on figure 15.

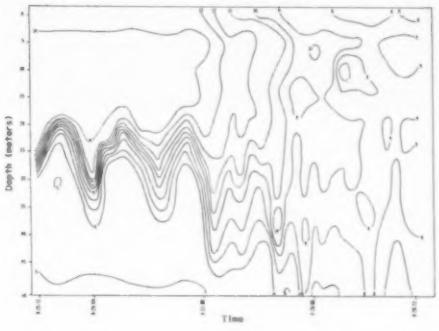


Figure 15.--Temperature profiles--Station 45006 9/25/1200 to 9/28/2200.

During late June, the temperatures from the buoy at Station 45006 were nearly isothermal with depth. Rapid warming commenced early in July and continued into August. The maximum surface temperature of 19°C was observed on August 23. During this period of warming, the development of a strong thermocline was observed, and the mean depth of the mixed layer increased. By mid-August, the mean depth of the thermocline was near 15 m with a thermal gradient near 2°C/m.

A slow, gradual cooling of the mixed layer began in late August and continued through mid-September in response to rather frequent cold frontal passages. Associated with the cooling were large-amplitude, internal waves with a period of approximately 14 hr. Part of this pattern can be seen on the left side of figure 15.

On September 27, a large storm system with winds over 15 m/s and low temperatures moved through the Great Lakes region. This resulted in local mixing and advection which completely destroyed the thermocline and increased the depth of the mixed layer to over 50 m. By late September 28, conditions at Station 45006 were approximately isothermal to near a 50-m depth. The destruction of the thermocline and the increase in the depth of the mixed layer can be seen on the right side of the figure.

Future subsurface temperature data will be quite helpful in understanding the temperature structure of the Great Lakes. As more data become available, the dynamics of the thermocline and the dynamics of the fall overturn will become better understood. These data will also be use-

ful in the forecasting of the winter freeze-up in the Great Lakes during years to come.

POLAR ICE MELTING CAUSES SEA LEVEL RISE, LONGER DAYS

Shrinking polar ice caps may be causing the earth's sea level to rise and days to lengthen, say two NOAA scientists in a report published in Science, the journal of the American Association for the Advancement of Science.

"Rising mean sea level is a significant indication of global climate change," Commerce Department scientists Robert Etkins and Edward S. Epstein report, pointing out that global sea levels have risen slightly more than one-tenth of an inch each year on the average since 1940, for a total of nearly 5 in. This is triple the rate of rise measured during the preceding half century, from 1890 to 1940.

Etkins and Epstein estimate that more than 10,000 cubic miles of polar ice, most of it presumably from Antarctic ice sheets, must have melted in the past 40 yr. They calculate that transfer of this great mass to the equivalent of a thin layer of water spread over the world's oceans also would tend to reduce the speed of the earth's rotation. This would lengthen each day by about one-thousandth of a second, accounting for about three-fourths of the actual increase in the length of the day observed by scientists over the past 40 yr.

While global warming, causing ocean waters to expand, might have accounted for some of the rise in sea level before 1940, since then the average global temperature appears to have gotten colder. This leaves the increased discharge and melting of ice from polar sheets as the only plausible explanation for the accelerated rise in sea level since 1940.

The melting ice, the two scientists suggest, absorbs heat from the ocean-atmosphere system and significantly reduces the surface warming that otherwise might have occurred.

They point out it is now possible to monitor the mass balance of the polar ice sheets by such methods as satellite altimetry, and urge that this be undertaken in conjunction with monitoring of global mean sea level, ocean surface temperatures, and the earth's speed of rotation.

Etkins is a staff member of the National Climate Program Office, while Epstein is director of the Earth Sciences Laboratory of NOAA's National Earth Satellite Service.

LETTERS TO THE EDITOR

WATERSPOUT

The following photographs were sent by Captain W. F. Schretzman, Master of the SEA-LAND ECONOMY. The SEA-LAND ECONOMY (fig. 16) encountered this waterspout (fig. 17) on July 8, 1980, at 0715, at 32°23'N, 77°13'W. The ship was enroute to Rotterdam from Jacksonville. The photograph of the waterspout was taken by Cadet Paul Forman of Texas A&M.

Figure 16.--The SEA-LAND ECONOMY.

Figure 17.--Waterspout by Cadet Paul Forman.

DECOMMISSIONING OF SS CRISTOBAL

The following letter was received from Robert L. Melrose, Port Meteorological Officer, Panama Canal. He presented Special Service Awards to Captain Krieg, 2d Officer Osborne, and to the CRISTOBAL (fig. 18).

The CRISTOBAL (fig. 19) was launched March 4, 1939, and served admirably for 42 yr. She had two sister ships, the PANAMA and ANCON. The CRISTOBAL was converted to a troop ship during World War II. She carried troops to Australia and artillery to New Caledonia, troops to Suez and took part in the invasion of Casablanca. She landed troops at Utah Beach after the Normandy invasion. After the war ended she transported the wounded, and war brides and children to the United States. She was returned to the Panama Line on June 14, 1946. Since 1961 she has sailed out of New Orleans rather than New York. During her earlier years she was primarily a passenger ship but the last few years she was mainly cargo. When she retired she was the oldest U.S. Merchant Marine vessel still active in blue water. The CRISTOBAL was a long and faithful member of the ship weather observing program.

Figure 18.--PMO Robert Melrose presenting the Public Service Awards to the CRISTOBAL, Captain Joseph Krieg (left), and 2nd Officer Manfred Osburn. Assistant Port Captain Gewin (right) looks on.

One of three sister ships constructed for the Panama Canal's Panama Line by the Shipbuilding Division of Bethlehem Steel in Quincy, Mass., the SS "Cristobal" was launched March 4, 1939, and sailed out of New York on her maiden voyage to Panama the following August 17. On January 11, 1942, the vessel was requisitioned for military use in World War II, serving first as a troop carrier and later transporting war brides, children and wounded soldiers stateside. On June 14, 1946, the "Cristobal" was returned to the Panama Line, where she continued passenger/cargo service between New York and Panama until April 1961. In June of that year the "Cristobal" made her first voyage between New Orleans and Panama, a route she was to ply until her last voyage on September 19, 1981, after 42 years of U.S. Government service.

Figure 19.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Port Meteorological Office
PSC Box 1301
APO Miami 34005

November 20, 1981

TO Elwyn E. Wilson, Editor
Mariners Weather Log

FROM: Robert L. Melrose
Port Meteorological Officer, Panama Canal

THRU: Bernard Zavos, W13
Chief, Overseas Operations Division

SUBJECT: Decommissioning of SS CRISTOBAL

The SS CRISTOBAL left Panama for the last time on September 19, 1981. For her longtime service in the Cooperative Ship Program I felt it was a good idea to acknowledge that fact. After obtaining permission from Chief, Meteorological Services (W135), I wrote up 3 "Special Service Awards". One went to the Captain of the CRISTOBAL, one to a longtime dedicated observer (2nd Officer Manfred Osborn), and lastly, one to the CRISTOBAL. I am told that the ships certificate will hang in the Panama Canal Commission Administration Building, Balboa Heights, along with other memorabilia of her long service.

Enclosed is a Decommissioning Certificate telling about the history of the CRISTOBAL; also the 'Panama Canal REVIEW' with information about the Panama Canal and the CRISTOBAL; and two photographs of the awards ceremony.

I hope that some of this information can be included in the Mariners Weather Log.

I have typed up a rough 'cutline' outlining the individuals in photos and the reason for the presentation.

I regret the delay passing this information along. I was looking for other photos (better quality) and more information. It didn't happen.

I hope you find the information interesting.

Attempts will be made to pass more information about the Panama Canal in the future.

Regards.

Enclosures: (5)

PUBLICATIONS OF INTEREST TO MARINERS

Two new publications on the climatology of tropical cyclones have recently been published. Both may be obtained by writing to the U.S. Superintendent of Documents, Washington, D.C. 20402.

Tropical Cyclones of the North Atlantic Ocean, 1871-1980 by Charles J. Newman et al. is an update of a previous publication of the same name covering 1871-1977.

A History of Tropical Cyclones in the Central North Pacific and the Hawaiian Islands, 1832-1979 by Samuel L. Shaw is a new publication. Besides statistics it contains descriptions of many of the storms.

Another publication that might interest many is First Aid For Boaters and Divers by the Council for National Cooperation in Aquatics (CNCA). It is a 112 page booklet with a waterproof cover. In addition to general first aid, it covers injuries caused by marine plants and animals, and pressure-related illness and injury. It was produced by CNCA in cooperation with Sea Grant. The booklet is available form the Publications Unit, Marine Advisory Service, Narragansett, R.I. 02882. The price is $4.95. Make checks payable to the University of Rhode Island.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log
July, August and September 1981

WEATHER LOG, July 1981--This was a quiet month even for a summer month. There were probably the normal number of cyclones, but they did not develop especially high winds or waves. There was no concentrated track that the cyclones followed. In general those storms that influenced the U.S. East Coast and the Maritime Provinces were on a northeast track and dissipated south of Greenland. The storms out of central Canada had an east-southeasterly track. They also tended to dissipate near Greenland. The storm centers were north of a line from northern Florida to Ireland.

The controlling feature on the mean monthly pressure pattern was the Azores High at 1029 mb near 41°N, 25°W. This was 4 mb higher and 700 mi northeast of its normal location. There were several low-pressure centers basically north of 60°N. The deepest was 1006 mb near Prince

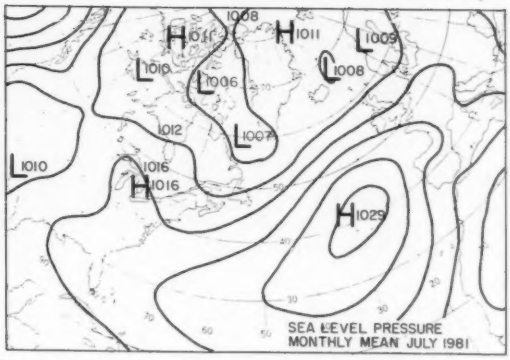


Figure 20.--July mean sea-level pressure.

Charles Island in the Foxe Basin. There was a 1007-mb center west of Kap Farvel, a 1008-mb center east of Iceland, and a 1009-mb center near the north end of the Gulf of Bothnia. These matched climatology fairly closely (fig. 20).

The largest anomaly center was plus 6 mb near 40°N, 20°W. There were several minus 2 to 4 mb centers north of a line from Cape Race to Stockholm.

The upper air pattern was primarily zonal over the water with slight ridging over midocean. The long-wave trough off the North American east coast was farther east than usual, particularly over the Labrador Sea. The long-wave trough over central Europe was also shifted eastward about 10° longitude.

Short-lived tropical storm Brett formed the last day of June but only survived 1 day of July.

Extratropical Cyclones--A cold front was moving across the Labrador Sea on the 1st with a weak frontal wave. The 998-mb center was south of Iceland on the 3d with a few gales. The WALDHORN and the DLBB had gales south of the center. A Canadian ship near Belle Isle had 44-kn westerlies. The storm was stationary near 58°N, 25°W, from about 1200 on the 3d to 1200 on the 4th, when the pressure was 985 mb. Several ships had gales. One near 60°N, 35°W, had 21-ft swells, and a ship south of the LOW had 20-ft swells. The storm had dissipated by the 7th between Iceland and the Faeroe Islands.

This storm tracked across Hudson Bay then turned southeastward. It was 986 mb over the Laborador Sea on the 4th. The BEN OCEAN LANCER had 40-kn winds near Hamilton Inlet, and the OCEA had the same off Cape Race. This storm was closely following the previous storm and producing a few gales. The C.P. VOYAGER reported 35 kn and 16-ft waves on the 5th and 6th near 53°N, 45°W. The LOW was 992 mb near 56°N, 30°W, at 1200 on the 6th. It turned northeastward on the 7th and started weakening. The LOW survived until the 10th.

Monster of the Month--This storm formed near Lake Winnipeg on the 7th. The storm was over Cape

Race at 1200 on the 9th. A Canadian ship in Cabot Strait had gales at the beginning of the day. By 1800 SEDCO had 48-kn southwesterly winds with 20-ft seas. The storm passed nearly directly over the platform about that time. By 0000 on the 10th the winds had switched to the northwest at 50 kn. About 15 mi away the ZAPATA registered 39 kn. The storm was 976 mb by 1200 near 53°N, 41°W. Three ships within 100 mi of each other, at approximately 50°N, 39°W, had 37- to 45-kn winds and seas up to 23 ft. Among them was the AMERICAN ALLIANCE.

On the 11th the storm was tracking northwestward toward Kap Farvel. OWS CHARLIE had waves up to 20 ft. The WALTHER HERWIG was fishing near Kap Farvel with 54-kn northerly winds in 21-ft seas. On the 12th another low center moved into the area and took over the circulation.

This cyclone was first noted over western Canada on the 7th. It traveled northeastward, then turned southeastward on the 9th and drifted slowly over Hudson Bay. The FREDERICK CARTER in Cabot Strait had 40-kn winds from the southeast on the 14th. The storm was over Cabot Strait on the 15th. At 1800 SEDCO measured 54-kn winds from the southeast. The winds in that area continued in the strong-gale to storm category into the 16th. The storm was traveling northward at 992 mb. It fell apart on the 18th.

The North Atlantic was rather quiet for the remainder of the month. The Azores High was firmly embedded in the vicinity of 45°N, 25°W. A ridge extended southwestward to the southeastern United States with a lesser center southeast of Bermuda. Short-lived frontal waves moved against this high pressure and were defeated. There were a few isolated gales reported here and there. This, of course, left the sea quiet.

This storm was one of the strongest of the month, but it involved only a very few ships in Hudson Strait. The storm came off the Beaufort Sea on the 26th and by 1200 on the 28th was 992 mb centered over the northwest shore of Hudson Bay. The first high wind report was at 0600 with the call letters CCGS of 43-kn winds from the southwest near 62°N, 75°W. At 1800 the PIERRE RADISSON also near 62°N, 75°W, had 55-kn southwesterly winds. The ships were apparently at the small

Port of Deception. At 0300 on the 29th the PIERRE RADISSON reported southerly 60-kn winds. Later on the 29th the winds decreased to 40 kn.

By 0600 the winds had again picked up to 50 kn. The DISKO at 70°N, 54°W, radioed winds of 37 kn. Upernavik, Greenland (73°N, 56°W) measured 45-kn southerly winds. On the 31st a ship with Soviet call letters near 69°N, 70°W, reported 45-kn winds. The storm had weakened rapidly and the isolated land stations were reporting winds of about 10 kn.

Casualties--Fog and thunderstorms were the main culprits this month. The 1,199-ton Hungarian TATA ran against a jetty at Kimolos during bad weather on the 3d. The GRETHE DANIA sank in dense fog on the 10th off the Netherlands. The Icelandic BERGLIND and the Danish CHARM collided in fog off Louisburg on the 20th. The BERGLIND sank off Glace Bay while being towed. No lives were lost. The CHRISSI AMMOS II was stranded in bad weather off Mykonos and refloated. A violent thunderstorm blew the KOCKCROW against a pier at Norfolk on the 21st. The pier was damaged and the ship went aground.

Lightning struck the 59,060-ton Japanese tanker HAKUYOH MARU at Genoa. The tanker had just finished unloading and exploded. Burning oil caused a fire on the INDUSTRIAL PROSPERITY, which was quickly extinguished. Burning oil on the water hampered fire and rescue services. Five persons were killed and 10 injured.

Other Casualities--The AEGIS HARVEST broke tow in heavy weather 26 mi southeast of Cape Receife on the 11th. The Japanese submersible pontoon KDG 1502 with the drilling platform SABINE IV on board broke the towing wire on the 24th in a force 10 storm about 60 mi from Port Elizabeth. The WESTAFTRADER and ITAQUATIA collided in misty weather in the outer roads of Santos, Brazil, on the 31st.

WEATHER LOG, AUGUST 1981--the most favored path for storms this month was from the Great Lakes to Newfoundland to Iceland. This corresponded to a climatological primary track. The path was reinforced north of Newfoundland by a secondary track from Hudson Bay. No storm crossed the European west coast south of 60°N except for Norway.

The dominant pressure system was the Azores High at 1025 mb near 38°N, 29°W. This was 2 mb higher than normal and 450 mi northeast of its normal location. The Icelandic Low was 1006 mb on the southeast coast of Greenland. This was about midway between the two normal 1008-mb centers. There also was a 1011-mb LOW center over Finland. A deep 1001-mb LOW near the North Pole did not directly affect the North Atlantic weather (fig. 21).

The largest anomaly centers were positive, a 9-mb center over Ireland and a 5-mb one over northern Quebec. The LOW near the North Pole resulted in a negative 11-mb center with a negative 8-mb subcenter over northern Greenland.

The upper air flow at 700 mb had a long-wave trough that stretched southwestward from south-

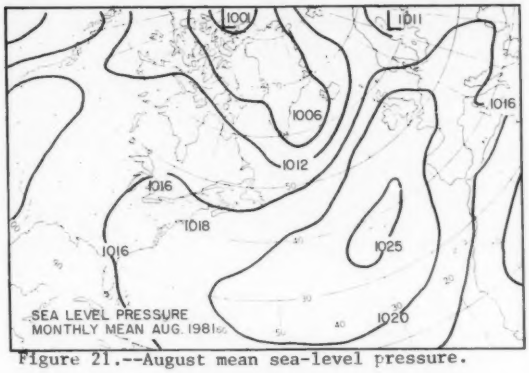


Figure 21.--August mean sea-level pressure.

eastern Greenland and paralleled the east coast of the United States. There was a smooth ridge over the United Kingdom that degenerated into a LOW near Lisbon. The HIGH was centered along 30°N latitude between 40-° and 50°W longitude. The anomaly centers approximated the surface anomaly centers.

Tropical storm Cindy and hurricanes Dennis and Emily roamed this ocean.

Extratropical Cyclones--The first 10 days of the month the Azores High was well entrenched in the vicinity of 40°N, 30°W. The cyclones followed a path from the Canadian Maritime Provinces to Iceland. During the middle of the month the HIGH retreated south and several frontal waves were able to form over the central ocean. The HIGH built northward again during the third week. The extratropical remains of hurricane Dennis penetrated into the central ocean before dissipating during the last week. Other cyclones were able to track farther to the southeast.

There was a hint of this LOW in the analysis for several charts. A fairly well-developed storm was moving northward over Baffin Island on the 12th. This LOW was apparent south of Cape Chidley on the 13th. There already was a southwesterley circulation over the salt water. At 0600 the LA COSTA and the OCEA west and east of Newfoundland had winds near 40 kn. At 1200 the ZAPA (47°N, 49°W) reported 53 kn. At 1800 the AMERICAN ACCORD (40°N, 59°W) found 47 kn as a wave formed on the front east of Cape Cod. On the 14th the PIERRE RADISSON near 60°N, 68°W, in the Hudson Strait reported northerly 55-kn winds.

The storm had been traveling southeastward, but on the 14th it turned northeastward. It moved over Kap Farvel on the 16th. There were isolated minimal gale reports during this period. On the 19th the LOW moved over Norway.

This LOW formed on the coast of Maine on the 17th. Gales were found over the Grand Banks on the 18th. On the 19th SEDCO and supporting ships in the area reported 40- to 45-kn winds. The AMBROSE SHEA (46°N, 60°W) had 44 kn. There was traveling northeastward as a frontal wave on the 20th. The SEALAND ADVENTURER near Sable Island measured

only 20-kn winds, but they found 36-ft swell waves. Weaker frontal waves were forming and dissipating on the front to the southwest. The MARSEILLE found 44-kn winds out of the southeast on the 22d with 20-ft seas near 46°N, 30°W. Later in the day the fishing fleet near Iceland was reporting winds in the 40-kn range. The FRITHJOF called the winds 57 kn and the waves 20 ft. The storm was 986 mb at 1200 on the 23d west of Iceland. The wind reports had decreased to less than gale force. The storm dissipated on the 25th.

This was the extratropical continuation of hurricane Dennis. Dennis weakened to a tropical storm on the 21st and was considered extratropical on the 22d. At 0000 the ACHILLES (35°N, 61°W), about 240 mi southwest of the center, had 45-kn winds and 26-ft waves. At 1200 three ships had gales, both north and south of the center, with the SANKOSTAR indicating 23-ft seas in the southwest quadrant. The EXPORT CHALLENGER (39°N, 50°W) had 40-kn winds with 33-ft waves. On the 23d the storm was 997 mb near 44°N, 41°W. The CARIBIA EXPRESS (40°N, 46°W) had 60-kn winds out of the north with 20-ft seas. The ALBERTIS at 36°N, 46°W, found 23-ft seas and 30-ft swells, also in the southwest quadrant in the same relative position to the center as the other high wave reports. The JEAN LYKES found 40-kn gales on the 24th.

The storm was weakening on the 24th as it turned northward. A complex LOW and frontal system was moving northeastward in the western quadrant. The HOLSTEN CLIPPER, south of the center, had 47-kn winds. The approaching storm absorbed this circulation on the 26th.

A front paralleled the Gulf Coast on the 21st. Waves were rippling along the front. On the 22d one of these crossed into the Atlantic and started deepening near Cape Hatteras. The WILMINGTON GETTY sent a special observation at 2200 of 47-kn winds, 20-ft seas, and 25-ft swells southeast of the center. On the 24th the storm was 994 mb near 42°N, 60°W. Several ships were reporting gales. The EEKLO (38°N, 66° W) had 23-ft waves, another ship (41°N, 62° W) had 20-ft waves, and another near 41°N, 59°W, had 26-ft waves. A U.S. ship reported 54-kn northerly winds near the storm's center on the 26th.

Mainly gales continued into the 27th, but the VRKB (49°N, 29°W) radioed a report of 68-kn westerly winds with 26-ft waves. The storm weakened on the 28th and disappeared east of Iceland on the 29th.

This frontal wave was first detected on the 27th near Sept-Iles. At 1200 on the 29th the storm was 997 mb near 58°N, 37°W. The PEARL (55°N, 29°W) was east of the occlusion with 52-kn southerly winds and 26-ft waves. The occlusion had just passed CHARLIE, which had 19-ft swell waves still from the south. The PEARL had 33-ft waves at 1800. Other ships were reporting gales up to 40 kn. By the 0000 chart of the 30th, this LOW could not be found, but another had developed near Kap Farvel.

All tropical cyclones have been consolidated into Hurricane Alley.

Casualties--The NICOLINE MAERSK grounded in the River Scheldt in fog on the 4th. The IBN SINA II contacted the SANDETTIE N. buoy in fog on the 7th. The 21,345-ton OCEAN GIRL suffered weather damage on the 9th to the 11th and deviated to Curacao. The tanker HARALABOS lost an anchor and chain at Maloga Roads on the 10th in bad weather.

The two American ferries NAUSHON, carrying 350 passengers, and the AURIGA, carrying 16 passengers, collided in fog early on the 10th near Woods Hole, Mass. Three crewmembers and 17 passengers were injured. The Spanish LUCIA DEL MAR stranded in mud in fog at Leixoes, Portugal, on the 14th.

The hydrofoil ferry PRINCESSE CLEMENTINA collided with the container vessel BUENOS AIRES early on the 14th, 5 mi off Calais. A sister jetfoil, the PRINSES STEPHANIE took on the 208 passengers.

The crane barge FAIRALP I loaded with stone grounded south of New Harbor at Visby, Sweden, in strong winds. The GEORGIOS T. KOROPOULIS had weather damage on the 22d and 23d on a voyage from Newport News to Bilbao. The 4,073-ton VALENTINA parted ropes at Piraeus on the 23d in stormy weather.

Other Casualties--The LNG tanker GUARUJA contacted the pier in strong winds at Montevideo on the 8th.

WEATHER LOG, SEPTEMBER 1981--There were fewer than usual significant extratropical cyclones this month. The month is noted for tropical cyclones. There was a short favorite path from off Cape Cod to about 53°N, 45°W. A secondary track extended from near 50°N, 25°W, northeastward to Scotland, then northward into the Norwegian Sea. One storm tracked from near Cape Cod to southern Ireland, then to the North Sea, and northward over the Norwegian Sea.

The Icelandic Low became more prominent this month at 1000 mb south of Iceland near 60°N, 20°W. This was 5 mb lower than normal and about 200 mi east of its normal position. There was an anomalous 1009-mb Low on the east coast of Hudson Bay. The Azores High at 1024 mb was 3 mb higher than the climatic normal and about 180 mi to the southeast. The average pressure over the eastern United States was near normal, but there was an anomalous 1013-mb LOW about 200 mi southeast of Nova Scotia (fig. 22).

There were three anomaly centers of importance to the weather over the ocean; two were negative. The first was minus 7 mb near 58°N, 17°W. The other was minus 4 mb near 40°N, 60°W. The plus 8-mb anomaly center was over the Davis Strait. Positive values covered the Labrador Sea, Greenland, Labrador, and the northern Canadian islands.

The primary Low center at 700 mb was over the North Pole. A trough extended southward into Hudson Bay. There was a secondary Low south of Iceland with a trough west of the European coast. A short-wave trough was indicated off the east

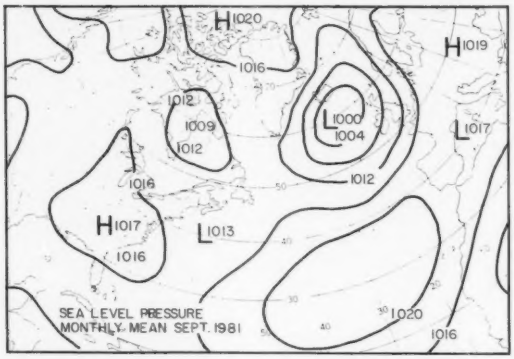


Figure 22.--September mean sea-level pressure.

coast of the United States.

There were four hurricanes this month: Floyd, Gert, Harvey, and Irene.

Extratropical Cyclones--On the 2d there was an area with several weak low centers south of Iceland and west of Ireland. On the 3d these consolidated into one center near 54°N, 28°W. A few minimal gales were beginning to blow. At 1200 on the 5th the 990-mb LOW was north of the Shetland Islands. Fishing vessels were finding gales to strong gales. A U.S. vessel reported 56-kn winds near 69°N, 06°W. On the 6th there were many reports of gales and strong gales, also wave reports over 20 ft. Among others, the DISCOVERY (66°N, 09°E) and the RAVENSCRAIG (65°N, 06°E) had winds of 45 to 52 kn with waves of 39 and 33 ft, respectively. Ocean Weather Station MIKE measured 47-kn winds. By the 7th the storm was well into the Arctic.

This cyclone formed in a col area resulting from Emily's weakening and another cyclone moving northeastward over Iceland on the 9th. It developed rapidly and had a large circulation by 1200 with some gales reported. At 1200 on the 10th, the storm was 980 mb near 57°N, 15°W. Several ships had winds over 40 kn. LIMA measured 46-kn winds and 23-ft seas. The DART CANADA (53°N, 23°W) also had 46 kn with 26-ft waves. There were not so many high-wind reports on the 11th, but the storm looked as severe as ever. The MATCO AVON (59°N, 02°E) found 50-kn winds and 20-ft waves. The storm turned westward on the 11th and deteriorated.

Monster of the Month--Quebec Province produced this storm on the 12th. It traveled eastward and was near 54°N, 30°W at 1200 on the 15th. The Polish ship SPZL (45°N, 39°W) had 52-kn winds. The OPALIA (56°N, 33°W) was in 42-kn winds on the 16th. The C.P. VOYAGEUR (53°N, 31°W) had 40-kn winds and 23-ft high waves on the 17th. There were many gales on the 18th, and the southerly circulation reached the North Sea. Winds were reported as high as 58 kn by the 9VUR. The storm stalled near 61°N, 18°W, and on the 19th a strong frontal wave moved through the southern circulation. There were many gales in the 40-kn range. ROMEO hit 40 kn with 20-ft seas. Fishing vessels south of Iceland had northerly winds generally in the 40's, but one off the northwest coast reported 60 kn.

On the 20th the frontal wave became the strongest of the two centers. It was 970 mb over the Irish Sea at 0000 on the 20th. Ships and platforms on the North Sea had a tough time with winds to 50 kn and waves to 25 ft. By the 21st this was the only LOW center. The strong winds in the eastern half had reached the Norwegian Sea at speeds up to 50 kn. The storm was weakening on the 22d, and there were only a few gale reports. It disappeared on the coast of Norway on the 23d.

At least three people died in the up to 70-kn winds that swept Britain. Crews of several small vessels had to be rescued. The trawler LE CHAMOIS sank north of Ushant, but five of the six crewmen were rescued. The TUNGUFOSS sank in force 10 winds and rough seas near Lands End. The 11 crewmembers were rescued. Twelve people were rescued by helicopter from the MFV 1057 which was sinking near Maplin Sands.

This storm formed over Charleston, S.C. It traveled along the U.S. East Coast, picking up strength and producing a few gales. As it moved over the Gulf of St. Lawrence at 975 mb on the 20th, the JOHN CABOT found 50-kn winds off Long Island. At 1200 the ZAPATA had 55-kn winds from the south. The LUISE BORNHOFEN had 36-ft swells, and the THALASSE had 26-ft seas. The storm had moved to 56°N, 57°W, by 1200 on the 21st. The NORTHERNSHELL found 50-kn winds off Hopedale, while the BEN OCEAN LANCER also had 50-kn winds with a pressure of 970 mb very near the center of the storm. There were only gale reports on the 22d and 23d, but CHARLIE measured 25-ft swell waves in the southwest quadrant of the storm. A second LOW had now formed east of the original center and gradually became the primary center of the storm on the 24th. CHARLIE was still contending with 20- to 25-ft waves on the 25th. The TILLIE LYKES found 45-kn winds on the outer southwestern edge of the storm. Yet another center formed west of Lands End. This increased the southern gradient and sharpened the trough. ROMEO had gales with 20-ft seas. Another switch of centers took place late on the 26th, and the storm was 973 mb near 57°N, 05°W, at 0000 on the 27th. There were many high wind and wave reports off the east, north, and west coasts of the United Kingdom. The storm rapidly lost strength on the 28th as another strong storm moved over the north central ocean.

The northern plains of the United States produced this storm. It traveled eastward and moved offshore near Cape Cod on the 23d and started intensifying. On the 24th a second LOW formed to the east, and there were mostly gales reported, but the SALVADOR (36°N, 73°W) reported 56-kn winds and did not include any waves. On the 25th and 26th the SEALAND INDEPENDENCE between 37°N, 62°W and 40°N, 58°W measured 30-kn northwesterly winds with 33-ft swell waves. By 1200 on the 26th the two centers had combined into one 978-mb LOW near 51°N, 50°W.

There were some gales up to 45 kn and waves approaching 20 ft. On the 27th the OCEA (48°N, 50°W) reported 55-kn winds and 23-ft seas. By 1800 the winds increased to 60 kn. The ATLANTIC CAUSEWAY (49°N, 42°W) found 33-ft waves from the southwest. The AMERICAN ARCHER had 50 kn on the 28th. Other ships were reporting 20- to 25-ft waves. The ZAPATA was measuring winds near 50 kn and waves of 20 ft.

The storm started weakening late on the 28th. There were swell reports up to 20 ft on the 29th as the storm turned northeastward. Another center formed southwest of the original center and 20-ft waves continued into the 30th. On October 1 the original center combined with another LOW center, and Jan Mayen recorded 45-kn winds. This center continued northward over the Norwegian Sea.

This storm had its origin over the Great Basin and came out of Colorado on the 25th. After moving out of the mountains it expanded rapidly as it traveled north-northeastward. By the 27th it was traveling east-northeastward and at 1200 on the 27th was 982-mb north of Thunder Bay. Lakers on Lake Superior found winds up to 45 kn on the 27th and 50 kn on the 28th. The JOHN DYKSTRA, EDWARD L. RYERSON, SAMUEL MATHER, and BENJAMIN F. FAIRLESS all reported westerly winds between 42 and 45 kn. The waves were 8 to 10 ft. On the 28th the HERBERT C. JACKSON and the WILLIAM CLAY FORD had 48- and 50-kn winds with the former reporting 18-ft waves on the eastern part of the lake.

The storm turned northeastward again on the 28th and by late that day the strong gradient was north of the Lakes. On the 29th another center developed over the St. Lawrence River and on the 30th the original LOW dissipated over northern Quebec.

All tropical cyclones have been consolidated into Hurricane Alley.

Casualties--The motor vessel SANDGATE ran aground in fog in the Detroit River on the 2d. The LENA collided with the TIKAL on the North Sea in fog. Hurricane-force winds tore the banana boat AMOA from her moorings on the 2d at Galveston.

The British cargo vessel ARCTIC TIDE encountered ice and suffered damage on a voyage from Ray Point in the Northwest Territories to Resolute Bay during the period August 29 to September 11. The drilling platform WEST VENTURE broke the towing lines outside Smola, Norway, on the 6th in heavy weather. The rig was later safely anchored. The SELBYDYKE, Archangel for Bordeaux, arrived Trondheim on the 7th with weather damage.

The LESLIE GAULT struck a bridge in fog at Aalborg on the 11th. The barge D-309 capsized in heavy weather off San Fernando on a voyage to Trinidad on the 15th. The bulkcarrier NORDHVAL grounded at Novorossisk on the 17th during a gale.

The KRONPRINSESSAN VICTORIA suffered damage while entering the ferry berth at Frederishavn during a heavy storm on the 20th. The tug OXY PRODUCER and barge OXY 4102 sank while anchored at Ponta Delgada during a heavy storm on the 20th. The Greek bulkcarrier ARMONIA suffered damage while docking at Quebec in 20-kn winds. The East German RONNEBURG encountered heavy weather in the Mediterranean the last of the month.

Other Casualties--The ALAMEIN arrived Cape Town on the 14th with weather damage from an encounter 1,000 mi west of Cape Town. The SWAN put into Maldonado Bay with a heavy list from boisterous weather. The GEMALA dragged anchor in high winds in the Maputo River.

North Pacific Weather Log

July, August and September 1981

WEATHER LOG, JULY 1981--There were fewer than normal cyclone tracks this month, and those that occurred were dispersed. Most were north of latitude 50°N. There were two areas where there was some concentration, one across eastern Siberia and the other along the eastern Aleutians and the Alaska Peninsula. None were exceptionally severe.

July is the one month of the year that the Aleutian Low does not show up in the climatological sea-level pressure pattern. It did not this month as the dispersed storm tracks would indicate. The only over-water feature was the large 1031-mb Pacific High centered near 43°N, 143°W. This was 6 mb higher and 400 mi northeast of its normal position (fig. 23).

For practical purposes the sea-level pressure over the ocean south of latitude 60°N was normal or above. There were two large positive centers, a plus 8 mb near 49°N, 140°W, and a plus 7 mb near 40°N, 160°E. This higher than normal pressure effectively suppressed the cyclones.

The upper air flow was mainly zonal north of latitude 40°N. The only low-pressure center was near the North Pole. The trough along the U.S. West Coast was accentuated. There were three

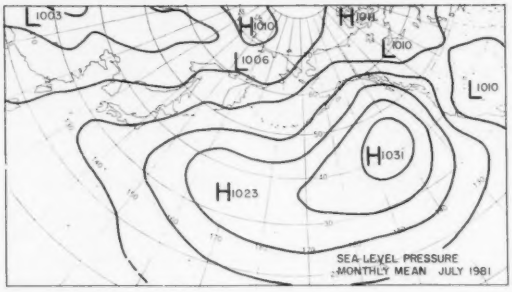


Figure 23.--July sea-level pressure.

negative height areas at 700 mb. One was off the U.S. West Coast, another at midocean at about 45°N, and the third was over the South China Sea.

There were four tropical cyclones over the western ocean: tropical storms Lynn, Nina, and Ogden and typhoon Maury. There were three over the eastern ocean, tropical storms Calvin and Eugene and hurricane Dora.

Extratropical Cyclones--As far as extratropical cyclones were concerned, this was a very quiet month. The Pacific High was big and strong, while the cyclones were weak and small. This is to be expected during a summer month, but this month was exceptionally quiet. There were isolated instances of gale reports with individual cyclones, but no pattern of severity. Often, the wave height was very low, which made the observation suspect. Some of the stronger winds were off the California coast, associated with a tight gradient between the Pacific High and the Great Basin heat low. Even here the sea and swell waves were low.

During the first 2 weeks two LOWs moved northeastward from midocean to the Bering Sea, splitting the Pacific High into two cells. The majority of the LOWs occurred during this first 2 weeks.

At the beginning of the third week the HIGH was firmly entrenched off the Oregon coast with subcenters over midocean. It controlled the weather south of an approximate line from Kodiak to Hokkaido. A frontal wave east of Honshu on the 22d tried to develop into a storm, but it was defeated by high pressure to the north and east. At 0000 on the 23d a ship in the southerly flow reported 26-ft waves. On the eastern edge of the HIGH off northern California (40°N, 126°W) the AMERICAN SUN and ARCO ALASKA had 35- to 40-kn gales with the waves reaching 12 ft at 1800 on the 22d.

This was the only extratropical storm this month that was significant according to the data; at that, it was only marginal. A frontal wave formed over the Sea of Okhotsk on the 25th. There were several low-pressure centers on the 26th. The DISCOVERER near 59°N, 174°W, had 36-kn winds from the south. The low-pressure centers combined into one by the 27th, and at 0000 the storm was 992 mb near 62°N, 180°. Bethel, Alaska, measured 45-kn southerly winds. At 1200 the OMMINESAN MARU (55°N, 167°W) had 39-kn winds. On the 28th the LOW was over the Chukchi Sea and the front was crossing the west coast of Alaska. The LOW continued northward with light winds behind the front.

Casualties--The 3,032-ton SAM EUN sank near 22°N, 115°E on the 4th during typhoon Kelly. The crew was safe. The floating hotel DARI LAUT was struck by lightning with a subsequent explosion on the 8th and sank between Caban and Maricaban Islands. On the 13th the 20,711-ton OGDEN CONGO and the 11,425-ton CHONG SUK collided in fog off southern Korea. There were no casualties. On the 15th the 3,000-ton SILVER STAR and the 2,000-ton DO NAM No. 1 collided in fog southeast of Pusan. There was no loss of life.

Other Casualties--The ASIA No. 12 sustained weather damage on the 1st on a voyage from Singapore to Dammam. On the 3d and 4th the IRON BARON experienced heavy weather in Bass Strait and the cargo shifted.

WEATHER LOG, AUGUST 1981--The most significant cyclones this month were tropical. There were about the usual number of extratropical cyclones, none unusually severe. They were concentrated from Mongolia into the Sea of Okhotsk and from Ostrov Beringa eastward into the Gulf of Alaska. The last half of the month, especially the last week, there were several storms centered over the midlatitudes in the central ocean.

The primary feature on the mean-pressure pattern was the Pacific High at 1023 mb, centered near 37°N, 148°W, a few hundred miles southeast of its climatic location. The Aleutian Low at 1008 mb was shifted to Bristol Bay from its normal location near 60°N, 175°E. The usual heat low was over the Gulf of California. The shifting of the Aleutian Low resulted in a trough dipping into the Pacific High near 155 W, and the Pacific High ridging more northwestward than usual. Low pressure replaced high pressure near the North Pole (fig.24).

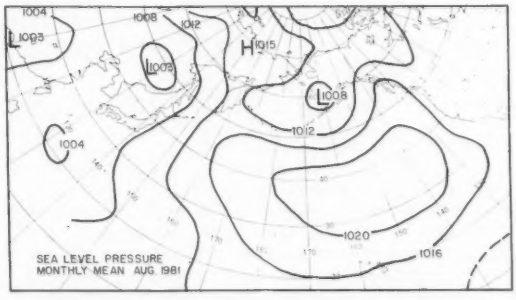


Figure 24.--August sea-level pressure.

The shifting of the Aleutian Low with its trough resulted in a 5-mb negative anomaly near the Shumagin Islands. The northwest ridging of the Pacific High brought a plus 4-mb anomaly center near 47°N, 170°E. The LOW over the Pole pro-

duced a large minus 11-mb anomaly center that stretched southward over Greenland.

The primary low center at 700 mb was near the North Pole as usual, but it was 114 m lower than normal. Two secondary centers affected the North Pacific. One was over the central Bering Sea, and the other was over northern Manchuria. The latter rotated the primary trough westward to the Asian coast. There was a flat trough near 170°W and another sharper one off the North American west coast.

There were seven western North Pacific tropical cyclones: tropical storms Phyllis, Roy, Susan, Vanessa, and Warren, and typhoons Thad and Agnes. The eastern North Pacific produced hurricanes Fernanda and Hilary and tropical storms Greg and Irwin. A total of 11.

Extratropical Cyclones--Since the Pacific High was the primary pressure feature, a brief description of its fluctuation seems appropriate. The first 5 days there was a large HIGH of about 1037 mb near 43°N, 165°W. On the 5th the HIGH split with one center southeast of Mys. Lopatka and the other west of northern California. This allowed a large LOW to develop over the north-central ocean. By the 12th the HIGH was again consolidating and dominated the temperate ocean, except off the Asian and Alaska coasts. The last week of the month the Pacific High closely approximated climatology. There was another high-pressure center about 1,000 mi east of Tokyo.

This storm had an odd path. It formed over central Alaska on the 5th and moved south-southwestward. By 1200 on the 6th the 998-mb center was near the Shumagin Islands. At 1800 the GALLEON TOPAZ (41°N, 151°W) was near the frontal zone with 48-kn southerly winds. At 0000 on the 7th the OAKLAND was east of the low center with 40-kn southerly winds, 18-ft seas, and easterly 30-ft swells. Later in the day the ALSTER EXPRESS and SEA-LAND COMMERCE had 40- and 35-kn winds, respectively, with the former reporting 20-ft swells near 52°N, 146°W.

The storm made a 180-degree turn on the 7th and was headed northeastward on the 8th. Early on the 9th the center dissipated.

Monster of the Month--Tropical storm Vanessa was near 30°N, 160°E, on the 17th and traveling northeastward. Late in the day an extratropical LOW formed on a weak front northeast of the tropical storm. By 0000 on the 18th it was 994 mb near 40°N, 173°E. The TOYOTA MARU No. 15, at 43°N, 172°E, north of the center, had 41-kn northeasterly winds with 12-ft. waves. The ERIKA BOLTEN (40°N, 180°) found 52-kn winds at 1800. The ORIENTAL STATESMAN (45°N, 168°W) measured 44-kn winds with no wave report on the 19th. A On the 19th a ship in the warm sector had 18-ft waves. The LESLIE LYKES (52°N, 157°W) found 35-kn northwesterly winds with 21-ft waves on the 20th as the storm was 970 mb south of the Kenai Peninsula. By 0000 on the 21st the storm was 958 mb almost directly over buoy 46002. The OVERSEAS CHICAGO near 52 N, 150 W, reported 30-ft seas and 33-ft swells with 40-kn winds. At 0600 the MOBIL MERIDIAN had 45-kn winds and 20-ft waves south of Yakutat. Buoy 46003 measured 21-ft seas at 1200. The OVERSEAS CHICAGO was sailing southward near latitude 46°N on the 22d with 20-ft swells. The storm started looping counter clockwise on the 21st and filling. On the 22d it was moving southeastward, and it disappeared on the 25th.

The Sea of Japan produced this storm on the 18th. It crossed the Tsugaru Strait and traveled along the Kuroshio Current. On the 21st it absorbed the extratropical circulation of tropical storm Vanessa. By 1200 on the 22d the storm was as far north as 59°N, 172°E, at 986 mb. On the 23d a secondary LOW formed to the southeast and became the primary center and moved southeastward. Several ships south of the center between 50°N and 55°N had gales. Late on the 23d and early on the 24th the PRESIDENT JOHNSON, near 49°N, 175°E, had 35-kn gales. Late on the 24th the DIANA had 47-kn winds in the same area, and 54 kn at 0300 on the 25th.

By the 26th the storm had deteriorated into three weak centers. One of these intensified and the BUM SIN found 43-kn winds near 40°N, 173°E. On the 27th this LOW was 988 mb near 44°N, 173°W. The BUM SIN now had 40-kn gales near 41°N, 178°E. The VERRAZANO BRIDGE on the other side of the storm (42°N, 168°W) had 39-kn gales out of the south. At 1800 the UNIVERSAL WING (48°N, 162°W) radioed winds of 47 kn. This storm weakened on the 28th and disintegrated over the Bering Sea on the 29th.

Casualties--The 157-ton fish-processing ship NORTHERN KING capsized on Bristol Bay in 30-ft seas on the 21st. Five of the seven crewmen survived. The HOKUETSU VENTURE had heavy weather damage on the 23d. The 2,996-ton ROSEBAY STAR and the NICHIAS MARU No. 11 collided in fog off Cape Inubo on the 24th. The ROSEBAY STAR sank. The ELISABETH OLDENDORFF had weather damage on arrival at Sasebo. The HYDERABAD was at Hong Kong with heavy weather damage.

Other Casualties--The 16,000-ton PRIMROSE went aground on the 2d in the Andaman Islands. Spear-carrying natives besieged the freighter, but monsoon winds and waves kept them from boarding the ship. The crew was rescued by helicopter to an Indian Navy vessel. The BLUE MASTER contacted the quay at Valparaiso on the 3d in heavy swell.

The barge DM 172 sank in Bombay harbor on the 10th in bad weather. The IRENE encountered heavy weather on a voyage from Karachi to Abidjan on the 18th. The SONIA SOPHIE S. grounded near Hallaniya Island on the 14th in bad weather.

WEATHER LOG, SEPTEMBER 1981--The cyclones traced a wide path this month between the Aleutians and latitude 35°N. The traffic into the Gulf of Alaska was heavy but spread throughout the Gulf. The mean of these tracks would be east-northeastward from Honshu, curving northeastward into the Gulf of Alaska. This mean track approximated climatology.

The gross pressure pattern also approximated climatology. The Aleutian Low at 1004 mb was slightly east of Kodiak Island, rather than the normal 1006 mb in Bristol Bay. There also was a 1008-mb Low over the northern tip of Sakhalin Island. The 1022-mb Pacific High was normally located near 33°N, 140°W. There was an anomalous 1021-mb subcenter near 30°N, 178°E, and a 1018-mb subcenter near 40°N, 163°E (fig. 25).

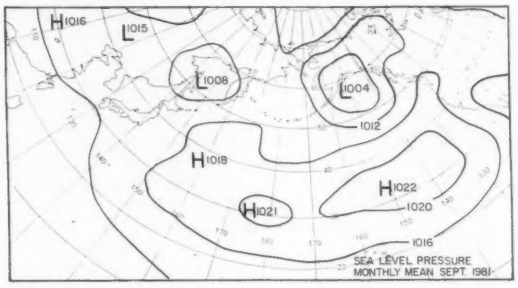


Figure 25.--September sea-level pressure.

There were three anomaly centers along latitude 55°N. A minus 6 mb over the Gulf of Alaska, a plus 7 mb over the Bering Sea, and a minus 3 mb over the western Sea of Okhotsk. There was generally higher-than-normal pressure across the subtropical ocean.

The upper air winds at 700 mb were mainly zonal between latitudes 35° and 50°N. There was a long-wave trough that paralleled the Asian coast slightly off the coast. Another long-wave trough paralleled longitude 150°W southward from Kodiak Island. These both were shifted eastward from climatology.

There were four typhoons over the western ocean: Bill, Clara, Doyle, and Elsie. Hurricane Jova and tropical storm Knut visited the eastern ocean.

Extratropical Cyclones--At times the ocean was cut up by many small extratropical cyclone centers with a tropical cyclone included for good measure. In general, this kept the severity of the extratropical cyclones low.

During the first week the Pacific High had a double center with the one over midocean dominating in the last of the week. This deflected the cyclones farther to the west and north. During the second week the High built back to double centers with the eastern center breaking down in the last part of the week. During the third week the Pacific High was multicentered with frontal waves forming between and south of the centers. The fourth week a HIGH off Japan moved northeastward to near the Aleutian Islands. It built southeastward, and by monthend was normally located off the North American coast.

This storm was the extratropical remains of typhoon Agnes. It became extratropical on the 3d over the Sea of Japan. On the 4th the ORIENTAL DIPLOMAT had 50-kn winds east of Tokyo. Later in the day, Japanese and Soviet fishing vessels reported winds from 35 to 50 kn along the Kuril Islands. On the 5th the storm was 976 mb near 50°N, 155°E. There were many wind reports near 50 kn, but the FORTUNSTAR (46°N, 162°E) reported winds near 60 kn twice. The waves were not as high as might be expected, but the PRESIDENT TYLER located 33-ft swells near 47°N, 157°E. At 0000 on the 6th she reported 40-ft swells. The wind was still blowing up to 50 kn at times.

On the 6th and 7th the storm was caught in the zonal flow and raced along the Aleutians. The maximum winds were gales with isolated swell reports of near 20 ft. The storm was moving northeastward into the Gulf of Alaska on the 8th. There were a few gales and high waves, which should not have bothered the merchant fleet. There was a 25-ft swell report near 50°N, 150°W, on the 9th. The storm weakened rapidly as it moved over Alaska.

This storm was also the extratropical conversion of a tropical cyclone--Bill. By 1200 on the 7th, Bill had incorporated a frontal system into his circulation and had lost the tropical characteristics. The storm was 992 mb near 45°N,170°E, at 0000 on the 8th. A Japanese ship had gales and 23-ft waves and 996-mb pressure less than 100 mi south of the center. The EAGLE ARROW (47°N, 165°W) reported 52-kn winds from the southeast at 0600 on the 9th. The 986-mb storm was near 51°N, 155°W, at 0000 on the 10th. The STAR MAGNATE (51°N, 141°W) reported 42-kn winds with 25-ft swells. The winds were generally gales on the 10th and 11th with a few reports of swell waves up to 20 and 25 ft. The storm moved over the coast near Yakutat on the 11th.

A frontal wave south of Tokyo was the beginning of this storm on the 8th. It traveled northeastward until the 10th, then eastward along approximately 47°N latitude. The winds were generally below gale force until the 14th. At 1200 the 982-mb storm was near 49°N, 148°W. At 1800 the BROOKS RANGE had 55-kn easterly winds near 58°N, 144°W, with 30-ft seas and 38-ft swells. The GOLDEN GATE (59°N, 145°W) had 48-kn winds, 30-ft seas, and 33-ft swells on the 15th. The storm went ashore on the 16th.

This was one of the frontal waves that developed between two HIGH centers. By 0000 on the 16th there were some near gales and the PACMONARCH, northwest of the center, had 26-ft swells out of

the north. Some gales developed on the 17th. At 1800 the ATLANTIC PIONEER (47°N, 141°W) reported 48-kn winds with 41-ft swells. The swells increased to 46 ft by 0600 on the 18th. The RED ARROW had 50-kn winds and 33-ft waves. The LOW was 970 mb at 0000 on the 18th near 50°N, 140°W. Several other ships had waves near 30 ft that day. This storm went ashore across the Kenai Peninsula on the 19th, 3 days behind the previous storm.

Two low-pressure centers combined into one off the Kamchatka Peninsula on the 21st. The first 18 hr the LOW moved toward the southwest, an odd direction. On the 22d the storm turned eastward and traveled along latitude 50°N. The storm was of little consequence until it approached the North American coast on the 26th. At 1200 it was 990 mb near 48°N, 138°W. Buoy 46004 measured 20-ft seas. On the 27th the PHILADELPHIA (55°N, 141°W) found 45-kn winds but very light 7-ft seas for the windspeed. Others were finding gales but also light seas. The buoy 46006 measured 20-ft seas 600 mi southwest of the center. On the first chart of the 28th a German ship (45°N, 138°W), near the same relative position to the center as was the buoy, found 33-ft waves. The storm was on the coast of British Columbia.

This storm formed in the wake of typhoon Doyle on the 23d just before he turned extratropical. The frontal wave first moved southeastward, then took a jagged northerly course. At 0000 on the 27th the 996-mb storm was near 42°N, 173°E. The SEA-LAND DEVELOPER (47°N, 175°W) had 45-kn east-southeasterly winds, and the QUINTINE (48°N, 175°E) had 38-kn east-northeasterly winds. By 0000 on the 28th the storm had split into two centers. The DIAMOND PHOENIX, west of the northern center, had 43-kn winds and 20-ft waves. Several other ships in the western quadrant had 15- to 20-ft waves. The analysis of 0000 on the 29th indicated the new southern LOW had captured the circulation, and a frontal wave was moving around its southern periphery. There were several 40-kn gale reports. On the 30th there was another switch of centers to the frontal wave. The SINCERE No. 5 (42°N, 179°E) was northwest of the center with 40-kn winds, 31-ft seas, and 34-ft swells. On October 1 the storm weakened and was no longer of consequence.

Casualties--The 10,262-ton OCEAN ENDURANCE was surveyed at Kobe for heavy weather damage the first of the month. The JONG KONG had leakage of seawater in heavy weather on the 3d near 26°N, 128°E. The YAYASAN TIGA requested a survey at Sasebo for weather damage on the 12th. The HOKUETSU VENTURE suffered weather damage. The CANMAR EXPLORER II had weather damage on the 28th while drilling in the Beaufort Sea. The NURLINA VI sank in the Strait of Macassau during a strong storm on the 29th. There were 64 passengers, 24 crew, 37 cows on deck, and 280 packages of general cargo in the hold. It was believed 33 people were lost. It is presumed the cows also were lost.

The following three vessels had weather damage at unspecified times: AOTEA, CAPTAIN HOOK, and the HOKUETSU MARU.

Other Casualties--The MANDAMA reported at Fremantle on the 9th with weather damage. The BELLE ISLE suffered weather damage in the Indian Ocean on the 5th. The SHEREEN reported at New Plymouth on the 11th with weather damage. The 300-ton sailing vessel TTN No. 48 sank in a storm off Sri Lanka. The VIRA drifted in strong winds and grounded on the 25th at Khulna, Bangladesh.

Hurricane Alley

Dick DeAngelis
Environmental Data and Information Service
Washington, D.C.

Along with our new quarterly format we are making a few changes in tropical cyclone presentation. First we are adding the North Pacific and North Atlantic summaries to this column. Now hurricane Alley will feature complete coverage of all tropical cyclones--hopefully. In addition, in order to be consistent with the Weather Log time periods we are going to try to match those periods in the tropical cyclone summaries. To do this we will need lots of cooperation from the tropical meteorological services, both foreign and domestic, and a little luck. The result will be up-to-date tracks and summaries on a global scale. The schedule should work like this:

Issue	Final tropical cyclone summaries
Winter	July, Aug., Sept.
Spring	Oct., Nov., Dec.
Summer	Jan., Feb., Mar.
Autumn	Apr., May, June

This issue will feature July, August, and September 1981 summaries. That is a jump of nearly one year. Eventually we will go back and fill in the gaps (tables 6 and 7).

NEW PUBLICATION

A History of Tropical Cyclones in the Central North Pacific and the Hawaiian Islands, 1832-1979 is authored by Samuel Shaw of the Central Pacific Hurricane Center, National Weather Service Forecast Office in Honolulu, Hawaii. This is the most complete work ever published about Central Pacific Hurricanes. It can be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

TROPICAL CYCLONE REPORT

The following letter was received from James Monti, a college student living in Irvington, N.Y:

In your "Hurricane Alley" article for the July-August 1981 Mariners Weather Log, you spoke of the possibility that tropical cyclones 18-81 and 19-81 (Fran) of the SW Pacific were of earlier origin than indicated by your tracking chart (p. 257). I have evidence that both supports your conclusion and gives some idea of the earlier history of the two systems.

During March 1981, I had been regularly listening to the 00:00 GMT SW Pacific weather statements broadcast on the National Bureau of Standards shortwave radio station WWVH, Kauai, Hawaii. At 110000Z, a "gale" was reported centered at 19°S, 151°W. I continued tracking this system for the next few days. When I compare the track of this low with your track of TC 18-81, I can only deduce that they must be the same single system. Therefore, the storm can be traced back at least as far as 110000Z.

The sequence of events leading up to the appearance of Tropical Cyclone 19-81 (Fran) is shown on the following two sheets of graph paper (not included). On March 13 (130000Z), thunderstorm activity was reported along the line shown (from 8°S, 165°W to 12°S. 150°W. then southeastward to 20°S, 140°W). By 140000Z,the thunderstorm axis

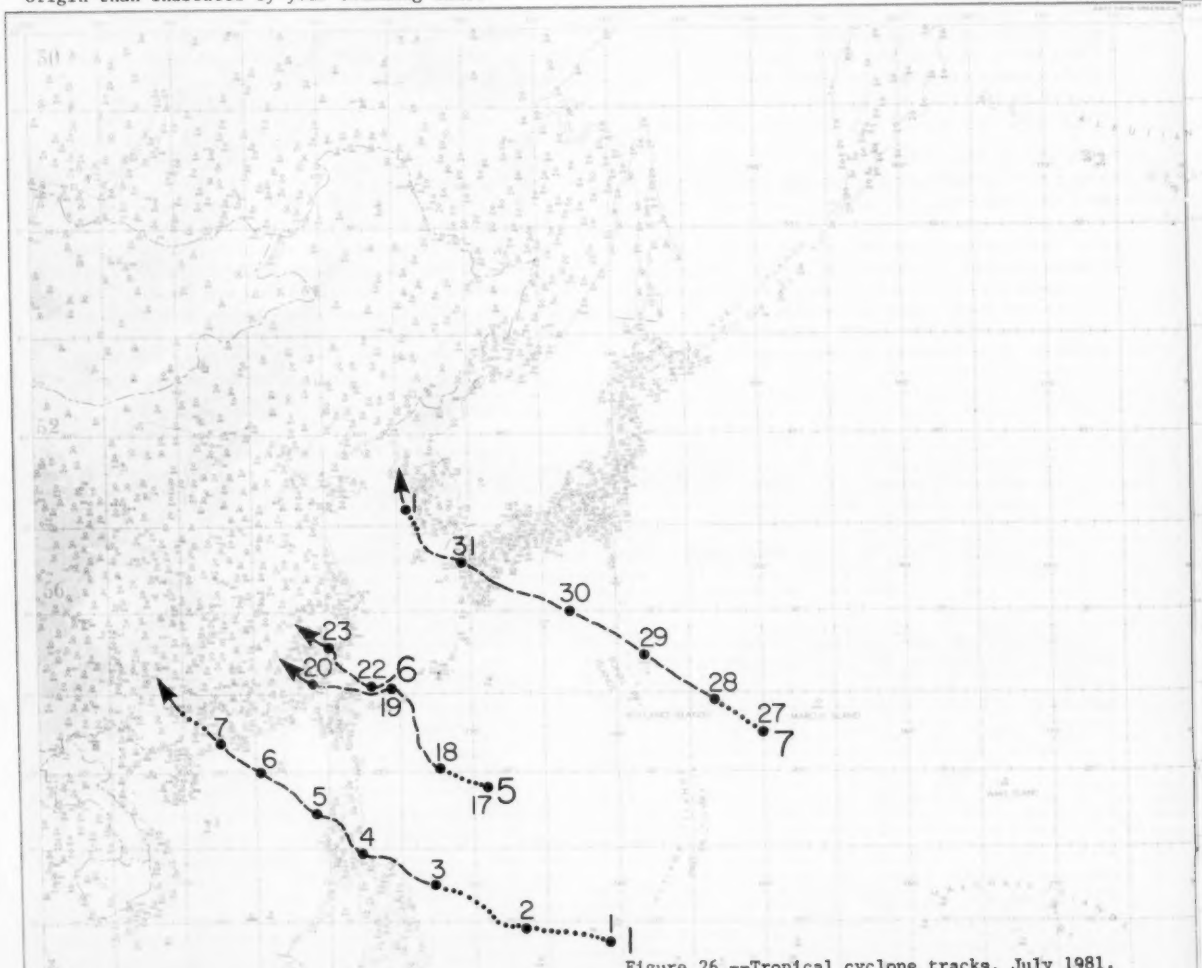


Figure 26.--Tropical cyclone tracks, July 1981.

had shifted southwestward. At 150000Z, thunderstorms were reported within the rectangular region. At 160000Z, thunderstorms were occurring north of 10°S, between 150°W and 180°. At 170000Z, a thunderstorm axis was again defined, but by 180000Z, the line had been shortened considerably. At 190000Z, thunderstorm activity was simply described as being present north of 10°S and west of 155°W. by 200000Z, a circulation of some sort was pinpointed at 15°S, 157°W. The track after this time almost perfectly matches your track of TC 19-81; therefore, the two tracks must represent the same system.

Note that from 130000Z through 190000Z, thunderstorms were continually present within some portion of the block bounded by 5°S, 155°W, 5°S, 165°W, 15°S, 155°W, and 15°S, 165°W. By 200000Z, a low had appeared on the southeastern periphery of this block, the low which was to become TC 19-81.

TROPICAL CYCLONES, JULY 1981

Seven tropical cyclones developed during this period, four in the western North Pacific and three in the eastern North Pacific. This activity is slightly below the normal of nine tropical cyclones. Only two reached hurricane or typhoon intensity (fig.26).

In the western North Pacific tropical storm Lynn developed on the 1st about 70 mi southeast of the Yap Is. She reached tropical storm strength on the 3d just east of Samar. Lynn crossed Luzon the following day, killing 17 people and leaving more than 65 thousand homeless. Winds near her center were estimated at 50 kn at 1200 on the 3d. Lynn was able to maintain minimal tropical storm strength after a rugged journey through the northern Philippines. As she crossed the South China Sea, Lynn began to rebuild. On the 5th the GANBARA, some 85 mi northeast of her

GLOBAL TROPICAL CYCLONES ORIGINATING JULY 1981

NO.	NAME	INTENSITY	DATES	NO.	NAME	INTENSITY	DATES
1.	LYNN	T	JULY 1-7	5.	MAURY	T	JULY 17-20
2.	CALVIN	T	JULY 4-9	6.	NINA	T	JULY 22-23
3.	DORA	H	JULY 10-16	7.	OGDEN	H	JULY 27-AUG. 1
4.	EUGENE	T	JULY 16-21				

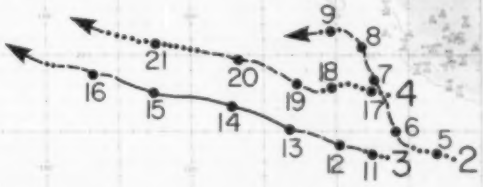


Table 6.--Global tropical cyclone summary, 1981.

No.	Name	Est. Max. wind (kn)	Basin	Dates
		July 1981		
1.	Lynn	55	W. North Pacific	July 1-7
2.	Calvin	45	E. North Pacific	July 4-9
3.	Dora	80	E. North Pacific	July 10-16
4.	Eugene	45	E. North Pacific	July 16-21
5.	Maury	55	W. North Pacific	July 17-20
6.	Nina	35	W. North Pacific	July 22-23
7.	Ogden	65	W. North Pacific	July 27-Aug. 1
		August 1981		
1.	Cindy	50	N. Atlantic	Aug. 2-5
2.	Phyllis	45	W. North Pacific	Aug. 3-4
3.	Roy	50	W. North Pacific	Aug. 4-9
4.	Fernanda	90	E. North Pacific	Aug. 6-12
5.	Susan	60	W. North Pacific	Aug. 6-13
6.	Dennis	70	N. Atlantic	Aug. 7-22
7.	Greg	65	E. North Pacific	Aug. 13-22
8.	Thad	85	W. North Pacific	Aug. 16-23
9.	Vanessa	55	W. North Pacific	Aug. 16-19
10.	Warren	45	W. North Pacific	Aug. 17-20
11.	Hilary	75	E. North Pacific	Aug. 21-28
12.	Agnes	95	W. North Pacific	Aug. 25-Sept. 1
13.	Irwin	45	E. North Pacific	Aug. 27-31
14.	Emily	80	N. Atlantic	Aug. 31-Sept. 12
		September 1981		
1.	Floyd	100	N. Atlantic	Sept. 3-12
2.	Bill	85	W. North Pacific	Sept. 3-7
3.	Gert	90	N. Atlantic	Sept. 7-15
4.	Harvey	115	N. Atlantic	Sept. 11-20
5.	Clara	120	W. North Pacific	Sept. 13-22
6.	Jova	75	E. North Pacific	Sept. 14-21
7.	Doyle	80	W. North Pacific	Sept. 19-23
8.	Knut	55	E. North Pacific	Sept. 19-21
9.	Irene	105	N. Atlantic	Sept. 21-Oct. 3
10.	Elsie	150	W. North Pacific	Sept. 24-Oct. 2

center, felt the sting of 55-kn winds. Early on the 7th Lynn passed over St. John's Island where winds hit 40 kn with gusts to 64 kn while sea-level pressure fell to 986.7 mb. A few hours later she crossed the China coast near Shang Chuan Shan and dissipated near Nanning that evening. Lynn caused considerable damage and killed 5 people in western Kwangtung province. In Hong Kong sustained winds ranged from 30 to 48 kn with gusts from 50 to 70 kn. Gales lasted for more than 10 hr at Cheung Chau and Chek Lap Kok. Tides ran about 3 ft above normal, while waves of 6 to 10 ft were observed at Big Wave Bay.

Tropical storm Maury formed on the 17th and reached a peak intensity of 55 kn late on the 18th and early on the 19th as he approached Northern Taiwan (fig. 27). Nearly 11 in. of rain fell over Taipei on the 19th resulting in widespread flooding. Tien Mou, a residential district, was under 12 ft of water. At least 31 people died with 11 missing.

After Maury dissipated over China, tropical storm Nina popped up just northeast of Taiwan on the 22d. Nina attained minimal tropical storm intensity--35 kn--that same day before moving inland over Foochow.

Typhoon Ogden, which had formed on the 27th some 240 mi west-southwest of Marcus Is., climbed to typhoon strength on the 30th. Maximum winds near his center reached 65 kn shortly before Ogden

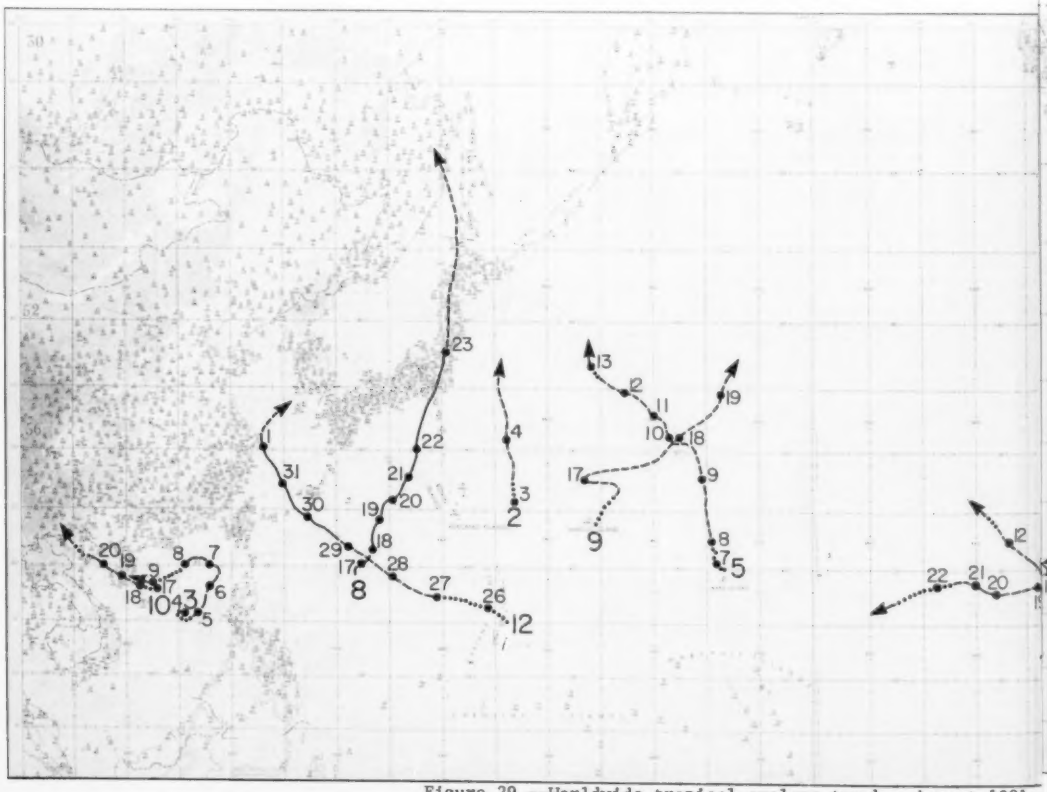


Figure 29.--Worldwide tropical cyclone tracks, August 1981.

Figure 27.--Without an eye it is difficult to pinpoint the exact center of the storm. Ship observations could be the answer.

moved ashore near Miyazaki on Kyushu. Ogden finally dissipated in the Yellow Sea on the 1st.

In the eastern North Pacific tropical storm Calvin came to life on the 4th some 360 mi south of Manzanillo. By late on the 5th, maximum winds were estimated at 45 kn; the following day they dropped back to minimal tropical storm strength where they remained until late on the 7th. As Calvin approached Baja California, winds climbed briefly to 40 kn late on the 7th and early on the 8th. However, Calvin turned westward and dissipated; evidently something got between Baja and its Calvin's.

A few days later hurricane Dora showed up just west of where Calvin had formed. By the 13th Dora was at hurricane strength. She reached maximum intensity on the 14th and early the following day when 80-kn winds roared around her center (fig. 28). However, on the 15th Dora was downgraded to tropical storm strength and weakened fast.

As Dora was dissipating Eugene was emerging about 130 mi southwest of Mazatlan. This tropical storm paralleled Dora's track and survived for about as long. Maximum winds climbed to 45 kn on the 19th, however 2 days later Eugene was floundering.

TROPICAL CYCLONES AUGUST 1981

August became the year's most active month when

GLOBAL TROPICAL CYCLONES ORIGINATING AUGUST 1981

NO.	NAME	INTENSITY	DATES	NO.	NAME	INTENSITY	DATES
1.	CINDY	T	AUG. 2-5	8.	THAD	H	AUG.16-23
2.	PHYLLIS	T	AUG.3-4	9.	VANESSA	H	AUG.16-19
3.	ROY	T	AUG.4-9	10.	WARREN	T	AUG.17-20
4.	FERNANDA	H	AUG.6-12	11.	HILARY	H	AUG.21-28
5.	SUSAN	T	AUG.6-13	12.	AGNES	H	AUG.25-SEPT.1
6.	DENNIS	H	AUG.7-22	13.	IRWIN	T	AUG.27-31
7.	GREG	H	AUG.13-22	14.	EMILY	H	AUG.31-SEPT 12

1981.

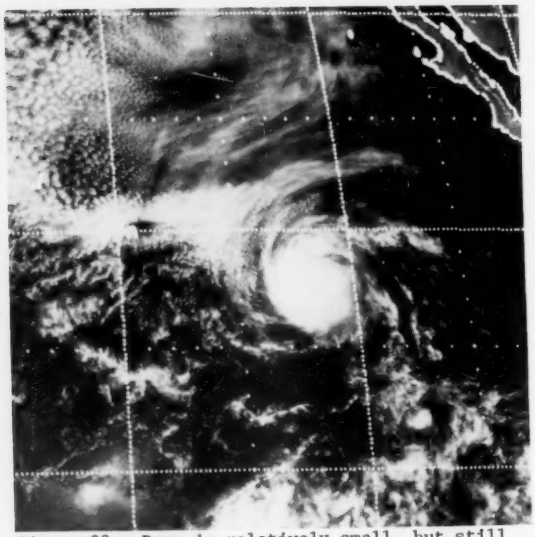


Figure 28.--Dora is relatively small, but still fills a 5° latitude-longitude square.

14 tropical cyclones came to life in the Northern Hemisphere; six of these reached hurricane or typhoon strength (fig.29). In an average year about 12 tropical cyclones develop and seven of these reach hurricane intensity, on a global scale.

Seven tropical cyclones developed in the western North Pacific but only two--Thad and Agnes--became typhoons. Both affected land areas as Thad moved across Honshu on the 22d and 23d while Agnes cut through the Ryukyu Islands on the 30th and 31st.

Thad caused flooding over eastern and northern Honshu where rivers swelled by rainfalls of up to 20 in. overflowed their banks, leaving 24 people dead and thousands homeless. The damage in Japan was spread over 21 provinces. Thad's effects also spread to the Soviet Far East when he moved slowly across the Khabarovsk region, which had been battered early in the month by former typhoon Ogden. It was reported that Thad generated 15-ft waves in the Sea of Okhotsk, capsizing at least one vessel.

Agnes brought her 95-kn winds into the East China Sea as the month came to a close (fig.30). Okinawa, 120 mi to the north, reported gusts up to 64 kn. In Naha streets were deserted as the winds uprooted trees and shattered billboards. Agnes brushed the China coast near Shanghai and recurved into the Korea Strait. She was responsible for more than 70 deaths as she carved a path of destruction through parts of South Korea, Japan, and eastern China. Along the south and east coasts of South Korea, where 13 to 26 in. of rain was reported, landslides and floods were responsible for at least 58 deaths and damage estimated at $24 million. Nearly 30 thousand people were left homeless and 167 fishing vessels were sunk or damaged. Landslides in Hokkaido,

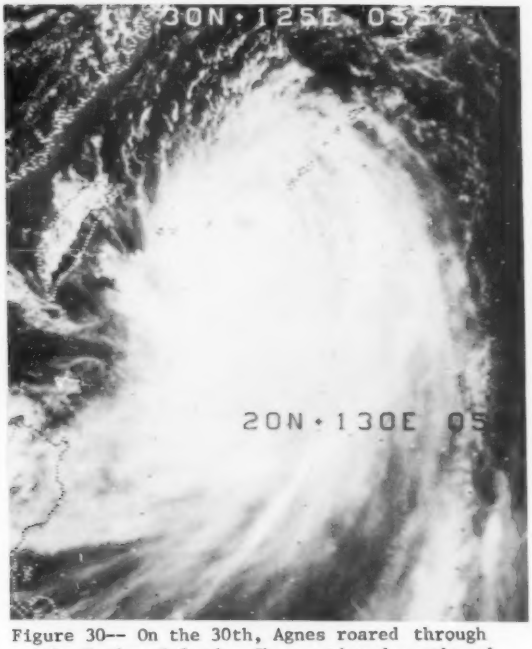


Figure 30-- On the 30th, Agnes roared through the Ryukyu Islands. She continued northward bring devastation to China, Korea, and Japan.

where nearly 8 in. of rain fell, were responsible for five deaths. In the Shanghai area, nearly 300 fishing junks capsized, seawalls collapsed or were breached in 200 places, and rice and cotton fields were inundated with sea water. The Huangpu River in Shanghai reached its highest level in 30 yr.

Tropical storms Vanessa, Phyllis, and Susan all developed east of Japan and north of 20°S. Susan came the closest to typhoon strength when her winds climbed to 60 kn on the 10th. Roy and Warren toiled in the South China Sea. Early on the 5th the OHRMAZD encountered 41-kn winds some 90 mi southwest

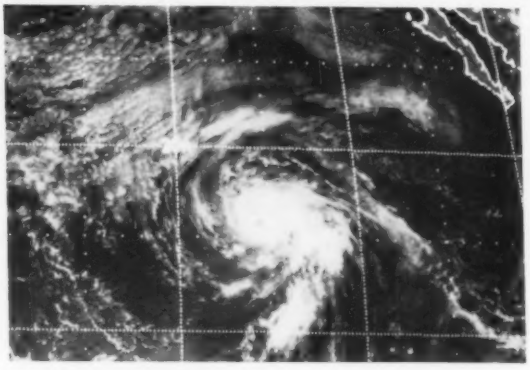


Figure 31.--Hurricane Fernanda on the 9th.

GLOBAL TROPICAL CYCLONES ORIGINATING SEPTEMBER 1981

NO.	NAME	INTENSITY	DATES	NO.	NAME	INTENSITY	DATES
1.	FLOYD	H	SEPT. 3-12	6.	JOVA	H	SEPT. 14-21
2.	BILL	H	SEPT. 3-7	7.	DOYLE	H	SEPT. 19-23
3.	GERT	H	SEPT. 7-15	8.	KNUT	T	SEPT. 19-21
4.	HARVEY	H	SEPT. 11-20	9.	IRENE	H	SEPT. 21-OCT. 3
5.	CLARA	H	SEPT. 13-22	10.	ELSIE	H	SEPT. 24-OCT. 2

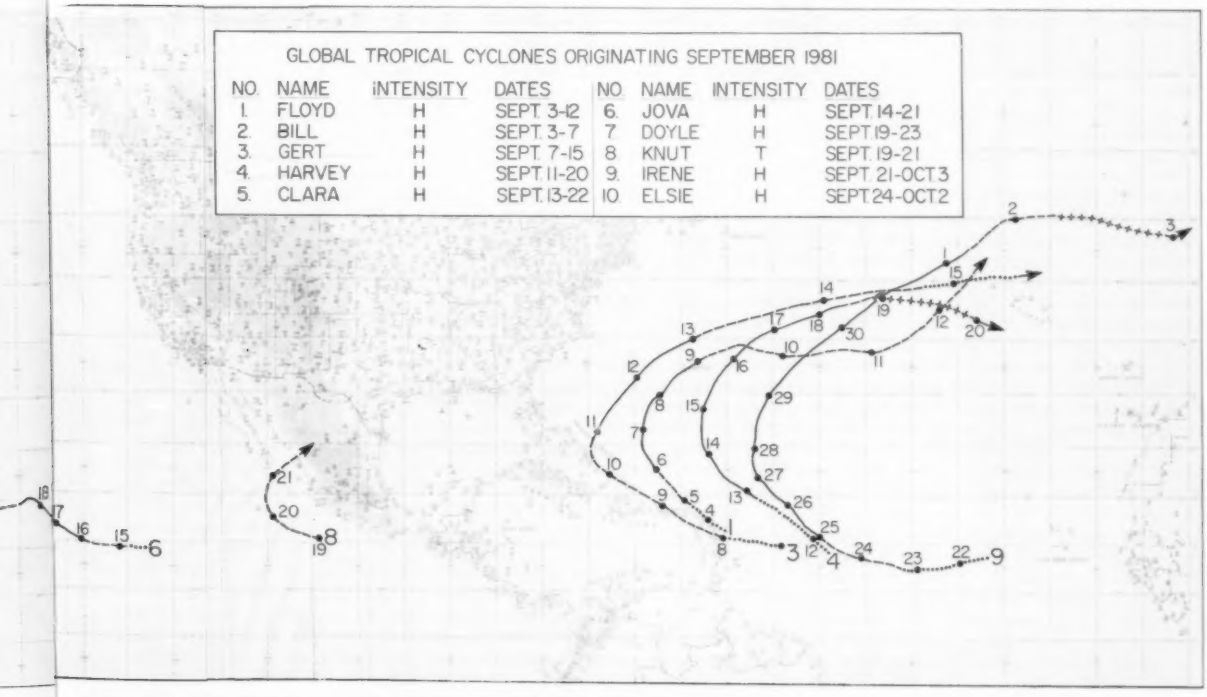


Figure 32.--Worldwide tropical cyclone tracks, September 1981.

Table 7.--World tropical cyclone watch, 1981

Western North Pacific			
Freda		H	March
Gerald		T	April
Holly	TC-3	T	April
Ike	TC-4	T	June
June	TC-5	H	June
Kelly	TC-6	H	June
Lynn	TC-7	T	July
Maury	TC-8	H	July
Nina	TC-9	T	July
Ogden	TC-10	T	July
Phyllis	TC-12	T	Aug.
Roy	TC-13	T	Aug.
Susan	TC-14	T	Aug.
Thad	TC-15	H	Aug.
Vanessa	TC-16	T	Aug.
Warren	TC-17	T	Aug.
Agnes	TC-18	H	Aug.
Bill	TC-19	H	Sept.
Clara	TC-20	H	Sept.
Doyle	TC-21	H	Sept.
Elsie	TC-22	H	Sept.
Fabian	TC-23	T	Oct.
Gay	TC-24	H	Oct.
Hazen	TC-25	H	Nov.
Irma	TC-26	H	Nov.
Jeff	TC-27	T	Nov.
Kit	TC-28	H	Dec.
Lee	TC-29	H	Dec.

North Indian Ocean			
--	27-81	T	Oct.
--	29-81	H	Nov.
--	31-81	H	Dec.

Australia-South Pacific			
Arthur	02-81	T	Jan.
Mabel	03-81	H	Jan.
	05-81	H	Jan.
Betsy	07-81	T	Jan.
Cliff	08-81	H	Jan.
Eddie	09-81	T	Feb.
Daman	11-81	T	Feb.
	12-81	T	Feb.
Neil	13-81	H	Feb.
Freda	14-81	H	Feb.
	15-81	T	March
Max	17-81	H	March
	18-81	T	March
Fran	19-81	T	March
	20-81	T	March
Klara	21-81	T	April
Alex	26-81	H	Oct.
Bessi	28-81	H	Nov.
Amelia	30-81	T	Dec.
Gyan	32-81	H	Dec.

South Indian Ocean			
Florine	01-81	H	Jan.
	04-81	T	Jan.
Helyette	06-81	T	Jan.
	10-81	T	Feb.
Johanne	16-81	H	March
Olga	22-81	H	April
Lisa	23-81	T	April
Paddy	24-81	T	May
Benidicte	33-81	T	Dec.

Eastern North Pacific			
Adrian	TD-1	T	May
Beatrix	TD-2	H	June
Calvin	TD-3	T	July
Dora	TD-4	H	July
Eugene	TD-5	T	July
Fernanda	TD-7	H	Aug.
Greg	TD-8	T	Aug.
Hilary	TD-10	H	Aug.
Irwin	TD-11	T	Aug.
Jova	TD-12	H	Sept.
Knut	TD-13	T	Sept.
Lydia	TD-14	T	Oct.
Max	TD-15	T	Oct.
Norma	TD-16	H	Oct.
Otis	TD-17	H	Oct.

North Atlantic			
Arlene		T	May
Bret		T	June
Cindy		T	Aug.
Dennis		H	Aug.
Emily		H	Aug.
Floyd		H	Sept.
Gert		H	Sept.
Harvey		H	Sept.
Irene		H	Sept.
Jose		T	Oct.
Katrina		H	Nov.

of Roy's center.

The eastern North Pacific spawned four tropical cyclones--Fernanda, Greg, and Hillary all reached hurricane intensity. Greg became a short-lived hurricane on the 20th when winds near his center briefly climbed to 65 kn shortly before he crossed into the central North Pacific region. Fernanda was better organized (fig.31) and maintained hurricane strength for several days and reached a peak of 90 kn late on the 10th and early on the 11th. Hillary was another short-term hurricane. She attained hurricane strength status on the 25th and held it for about 24 hr; maximum winds climbed to 75 kn during that period. Tropical storm Irwin was the only system to make landfall, which he did over the tip of Baja California on the 30th.

Three North Atlantic tropical cyclones developed in August; two of them--Dennis and Emily--reached hurricane intensity. Cindy developed from a subtropical system off the mid-Atlantic coast but was a minor storm; maximum winds climbed to 50 kn. Dennis had two chances and finally reached hurricane strength over the Gulf Stream east of North Carolina. Earlier heavy rains from the tropical storm caused an estimated $25 million in flood damage in Florida. Emily came to life on the last day in August but was mostly a September storm. She began as a subtropical storm between Florida and Bermuda and reached hurricane strength on the 4th. Her maximum winds were estimated at 80 kn.

TROPICAL CYCLONES, SEPTEMBER 1981

September saw the development of 10 tropical cyclones, slightly below the normal average of 12.

In the western North Pacific four typhoons came to life. Elsie, on a textbook track, reached super typhoon intensity and maintained it from the 27th into the 29th. During that period maximum winds were estimated at 150 kn at 0000 on the 28th (fig. 32). The PRESIDENT VAN BUREN, three days out of Yokohama, was overtaken by an accelerating Elsie on the 2d. Winds climbed to 70 kn in 10 to 12 ft seas as the ship steamed 100 mi east of the storm center; the pressure dipped to 967 mb. Typhoon Clara, whose maximum winds climbed to 120 kn on the 19th and 20th, was responsible for the Philippine Navy's worst disaster since World War II. The 1220-ton destroyer DATU KALANTIAW, ex USS BOOTH, carrying 97 officers and men was driven up on a reef by Clara's

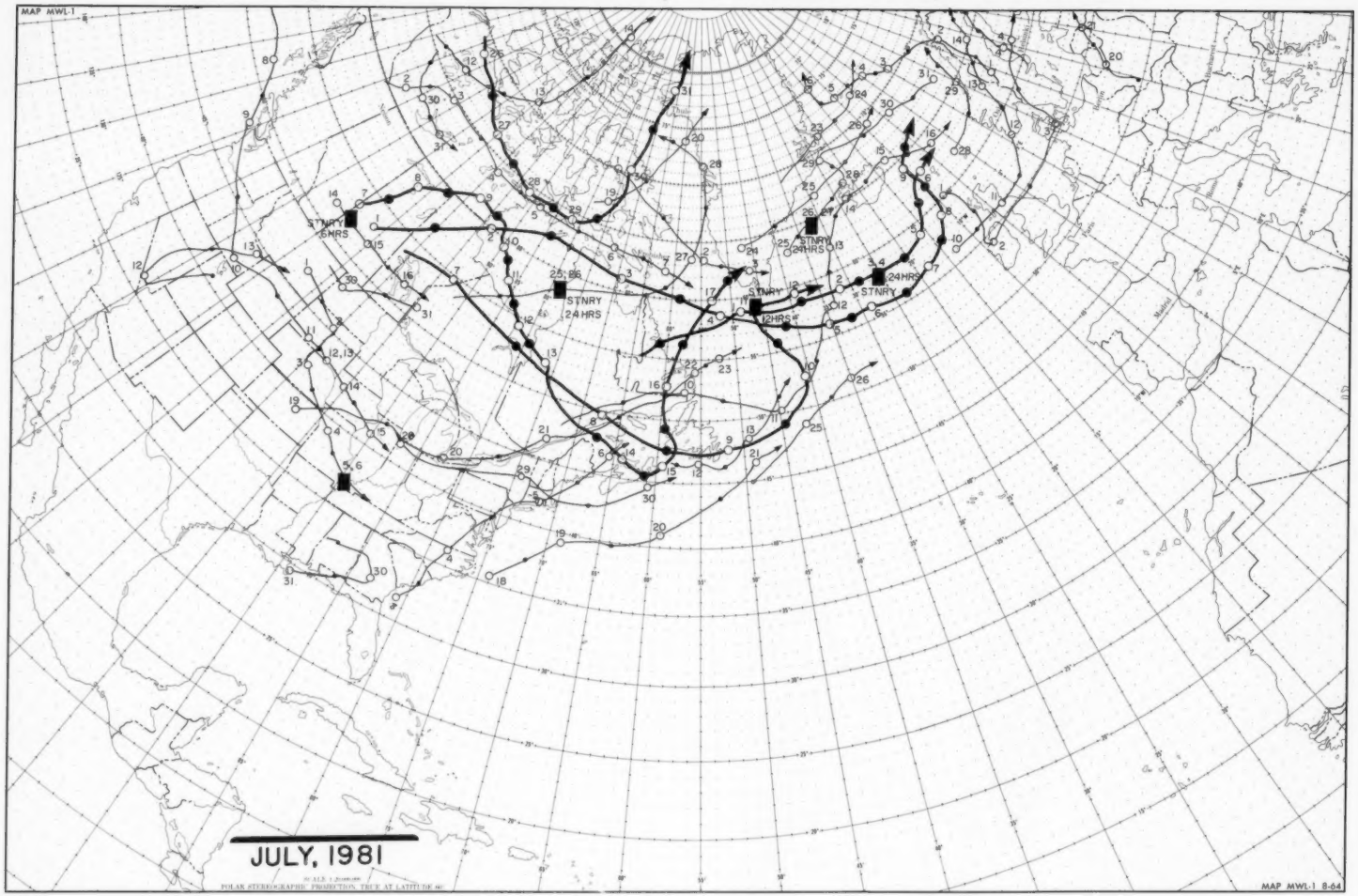
Figure 33.-- The Philippine destroyer escort DATU KALANTIAW lies on her side after being driven aground on Kalayan Island by typoon Clara. Wide World Photos.

winds, on the 20th, some 330 mi north of Manila. Several ships joined in the search for survivors while welders cut open the hull with blow torches hoping to save trapped sailors. An estimated 52 people died, many, including the wife of a crewman, were washed off the deck by giant waves as they prepared to jump the ship, which lay just off Kalayan Island (fig.33). Clara also caused havoc in the Philippines when her torrential rains caused flooding along the Agno River. In the mountain resort city of Baguio 36 families were evacuated as floodwaters rose to 8 ft. When Clara crossed the China coast on the 21st her torrential rains resulted in serious damage in Fujian province, where nearly 50 thousand acres of rice paddies and 300 thousand acres of sugar cane were damaged or destroyed. Typhoons Bill and Doyle developed well east of Japan and north of 20°N. Bill's peak winds reached 85 kn on the 5th. Doyle was a typhoon on the 21st and 22d; his maximum winds were estimated at 80 kn.

Hurricane Jova and tropical storm Knut appeared in the eastern North Pacific. Jova made it across 140°W into the central region and as a tropical storm passed within 90 mi of the island of Hawaii on the 20th. A few hours earlier the SUGAR ISLANDER encountered 35-kn easterly winds 135 mi northwest of Jova's center. Jova had reached a peak on the 17th when maximum winds were estimated at 75 kn. Knut had 55-kn winds on the 20th but then recurved and entered Mexico near Mazatlan.

Four hurricanes originated in the North Atlantic during September--including Emily five roamed these seas. Floyd, Harvey, and Irene were the strongest storms of the year, with winds reaching 100 kn or more; Harvey's climbed to 115 kn. All these systems followed recurving tracks through the western North Atlantic. Irene was the most persistent; on September 4 she crossed into France as a large extratropical low.

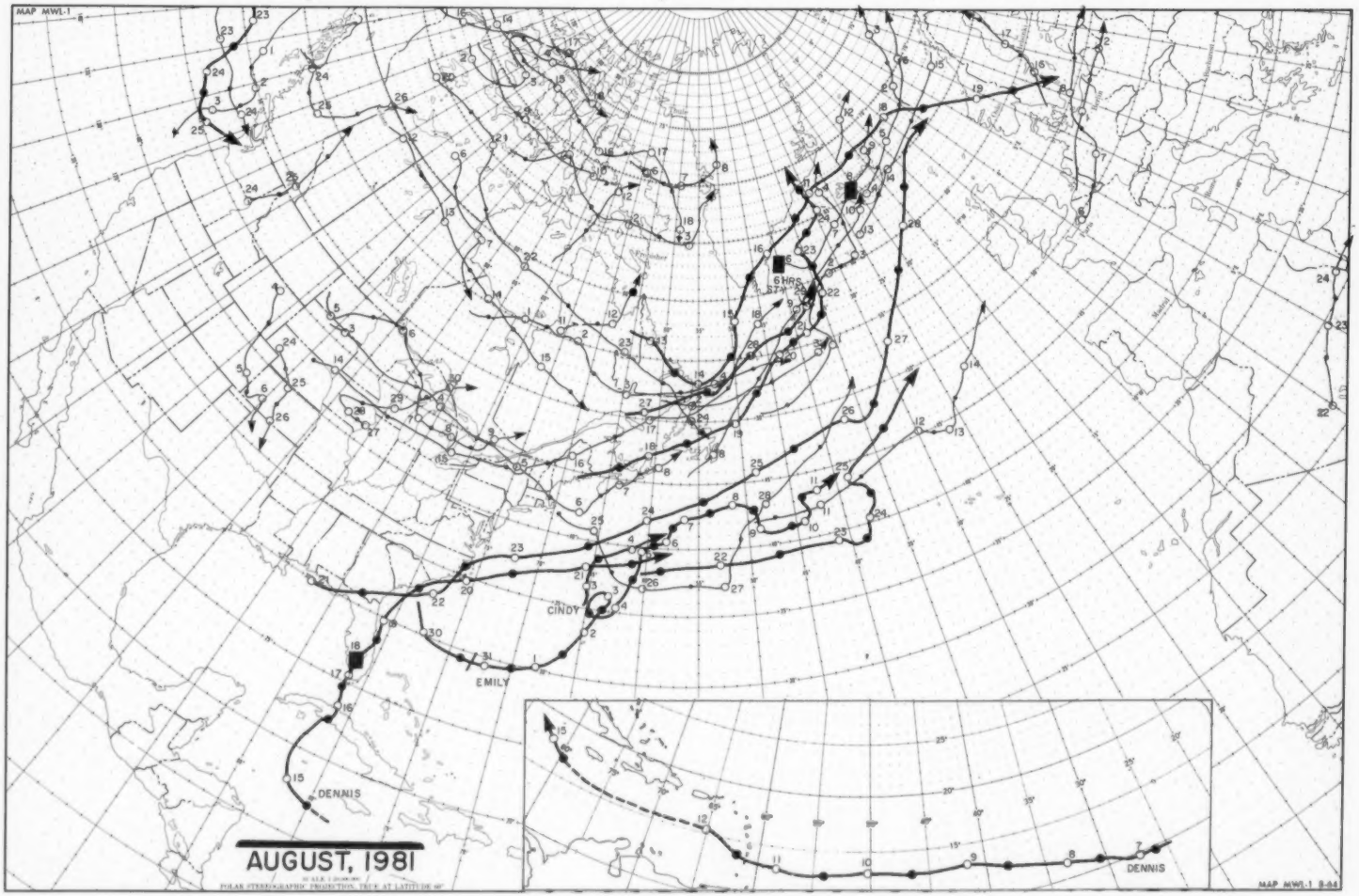
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

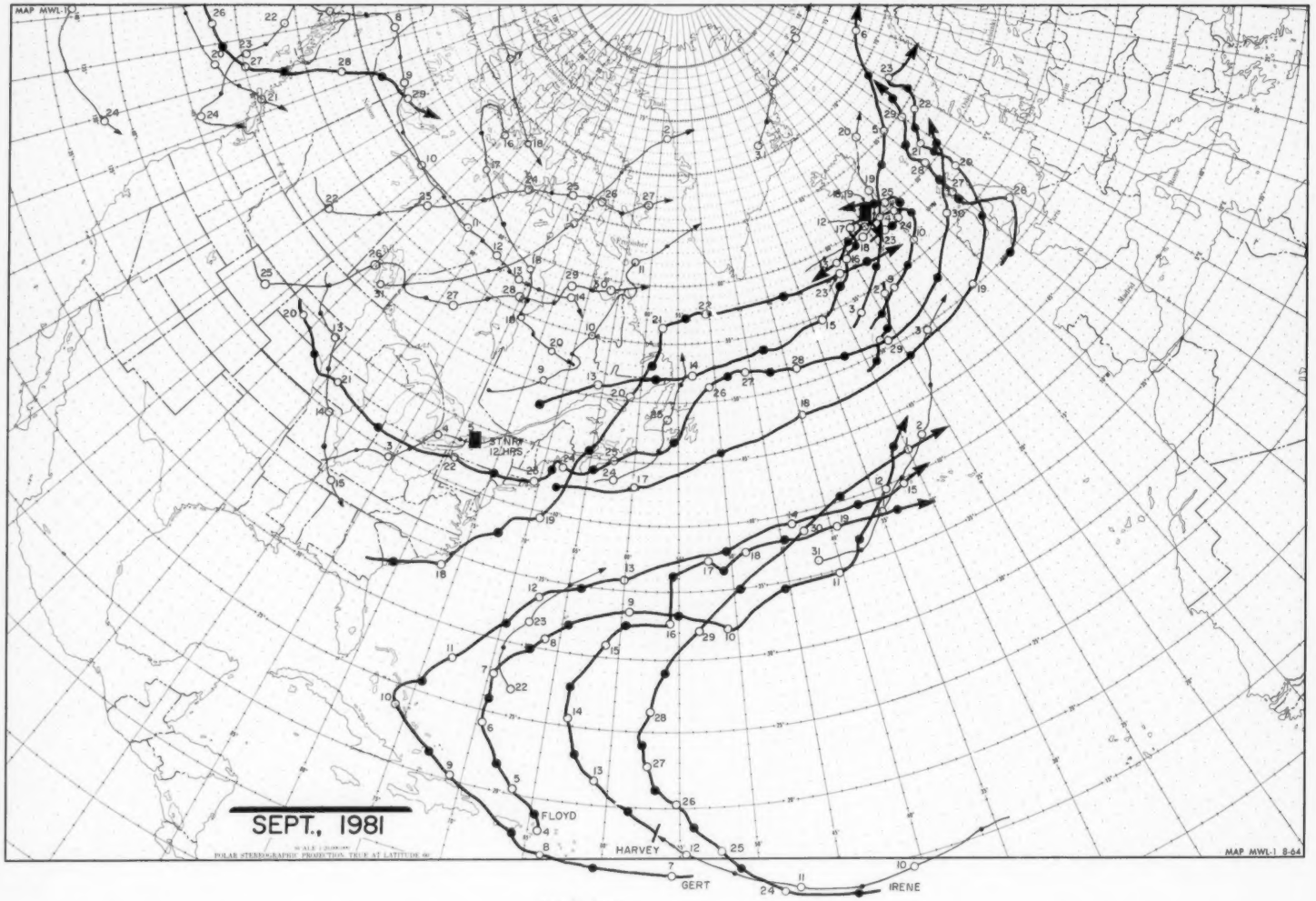
heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic

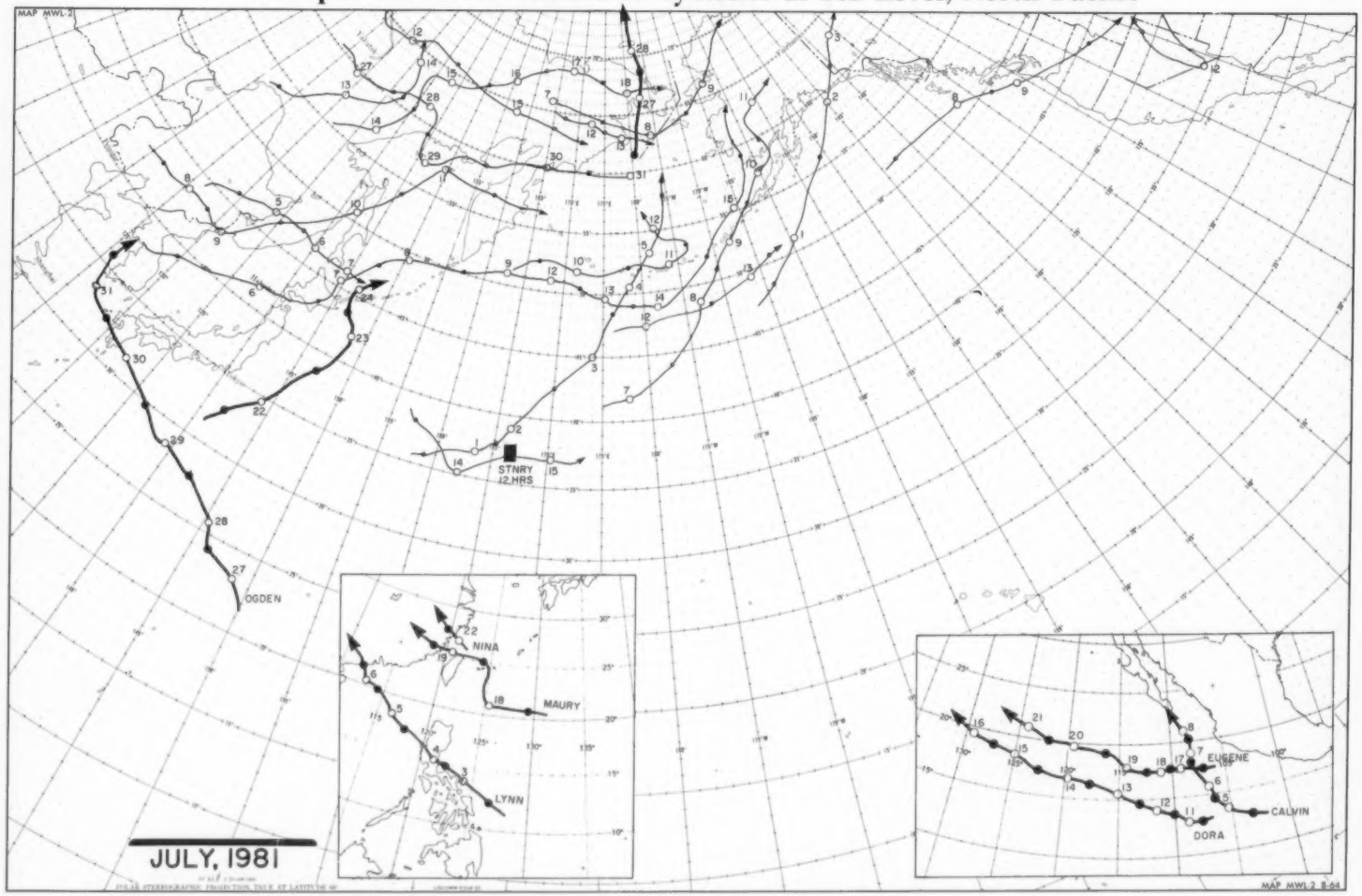


positions

Closed circle indicates 0000 and open circle 1200 GMT poistions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

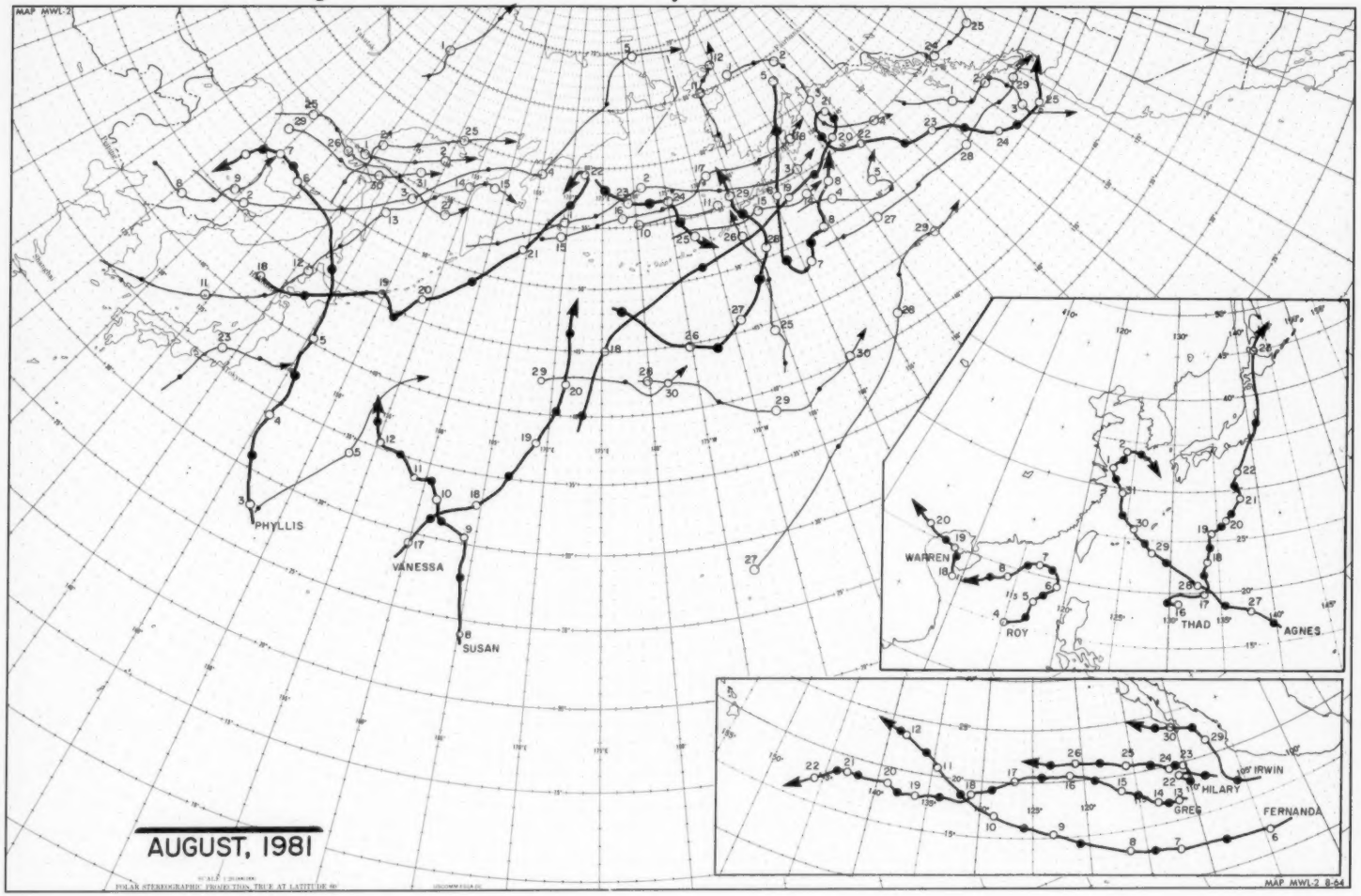
heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



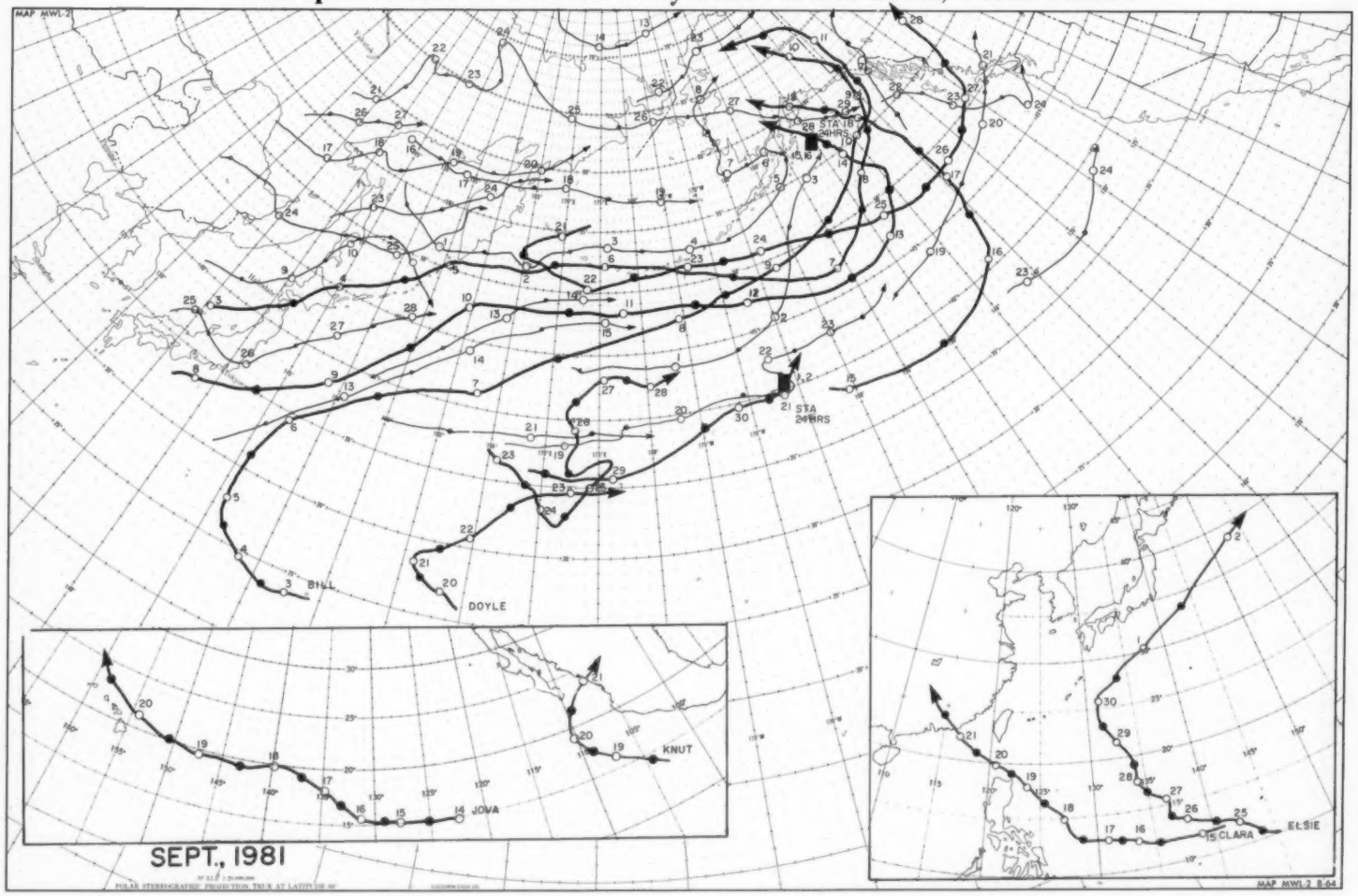
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

July, August and September 1981

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C: Air	Temperature °C: Sea	Sea Waves+: Period sec.	Sea Waves+: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.*	Swell Waves: Height ft.
NORTH ATLANTIC OCEAN		JULY															
KNORR	KCEJ	3	52.6 N	27.0 W	06	26	M 35	5 NM	02	1000.5	11.1	13.3	3	11.5	28	6	14.5
TFL FREEDOM	9VXX	4	48.0 N	34.4 W	00	25	M 35	10 NM	03	1007.5	16.8	17.0					
BALTIMORE TRADER	KASJ	9	13.1 N	77.8 W	12	05	35	5 NM	25	1012.0	26.7	27.8	3	5	05	6	10
MARJORIE LYKES	KAKP	9	42.7 N	45.8 W	18	21	45	2 NM	62	0998.9	22.8	19.4	4	14.5	23	8	14.5
EVERGREEN WAGO-295	NRXD	9	43.1 N	43.5 W	18	20	M 37	5 NM	40	1003.1	21.0	20.4	5	10			
NORTHERN LIGHT	NGYS	9	58.2 N	53.3 W	18	09	M 36	2 NM	60	0998.0	7.2	5.6	6	10	06	>13	23
NORTHERN LIGHT	NGYS	10	59.0 N	52.3 W	00	04	M 33	2 NM	07	1004.0	6.7	5.6	6	10	06	>13	26
MARJORIE LYKES	KAKP	10	42.7 N	47.2 W	00	21	35	5 NM	02	1005.6	15.5	17.7	4	13	23	7	14.5
BALTIMORE TRADER	KASJ	10	15.7 N	76.5 W	00	05	35	5 NM	05	1012.0	26.7	27.8	3	5	05	< 6	8
AMERICAN LEADER	KFEJ	10	47.9 N	38.3 W	06	23	40	5 NM	02	0995.8	16.0	17.2	12	19.5			
AMAZONIA	WYQ5906	10	08.4 N	55.7 W	11	09	M 10	10 NM	03	1013.0	27.2		2	3	02	7	29.5
AMERICAN ALLIANCE	KFEM	10	50.1 N	38.7 W	12	22	40	2 NM	02	0990.0	12.8	14.4	7	23	22	7	23
AMERICAN ALLIANCE	KFEM	11	49.3 N	40.0 W	00	22	40	5 NM	02	1001.6	12.8	13.3	6	24.5	22	6	24.5
ADM WM M CALLAGHAN	KGYE	11	53.9 N	32.9 W	00	25	35	5 NM	15	0997.2	11.7	10.0	5	13	22	8	16.5
ADM WM M CALLAGHAN	KGYE	12	50.4 N	42.3 W	00	29	35	5 NM	15	1001.0	11.2	8.9	5	13	25	8	14.5
SANTA ELENA	WLGR	12	12.5 N	78.2 W	18	09	M 35	5 NM	03	1006.5	28.6	27.7	XX				
SEALAND GALLOWAY	KHLX	13	43.1 N	39.0 W	00	20	35	2 NM	41	1020.0	20.5	17.8	5	8	20	8	13
SEALAND GALLOWAY	KHLX	15	41.3 N	60.3 W	00	18	35	5 NM	02	1006.5	21.7	21.2	5	8	18	8	14.5
GEORGE M KELLER	SMYV	17	33.6 N	28.6 W	12	24	M 40	10 NM	03	1023.5	20.5	21.1	XX	14.5	24	7	18
CHASTINE MAERSK	OWCY	16	37.5 N	10.6 W	12	01	40	10 NM	02	1019.0	18.4	20.0	8	13	01	11	19.5
DEL VALLE	KPNA	20	17.4 N	51.6 W	00	09	46	10 NM	03	1018.0	25.5	26.1	8	8	08	8	10
SAN JUAN	WRGO	21	19.9 N	66.5 W	00	12	35	5 NM	25	1015.2	26.1	29.4	5	8			
SEALAND RESOURCE	WJMD	26	49.3 N	39.0 W	12	34	40	5 NM	81	1016.8	14.7	12.8	5	6.5	34	7	11.5
ADM WM M CALLAGHAN	KGYE	29	45.6 N	56.2 W	00	29	35	10 NM	02	1010.0	15.0	13.4	5	13	29	7	19.5
GREAT LAKES VESSELS																	
ENDERS M VOORHEES	9614	9	47.0 N	85.7 W	00	27	M 36	.5 NM	42		14.0	3.0	3	3			
		AUG.															
SEALAND GALLOWAY	KHLX	1	48.5 N	30.1 W	18	23	35	.5 NM	10	1005.8	16.5	16.1	3	8	23	6	8
SEALAND GALLOWAY	KHLX	2	47.9 N	33.0 W	00	23	35	5 NM	02	1008.5	15.6	16.8	4	6.5	23	8	11.5
GLOMAR CHALLENGER	WNCU	3	56.0 N	23.2 W	06	25	M 35	5 NM	02	1005.0	13.3	13.5	9	10			
SEALAND GALLOWAY	KHLX	4	41.4 N	58.5 W	09	19	37	5 NM	02	1014.2	21.1	21.1	7	8	24	6	14.5
GLOMAR CHALLENGER	WNCU	8	56.1 N	23.3 W	00	27	M 38	10 NM	02	1015.8	11.7	13.3	7	8			
SEALAND GALLOWAY	KHLX	13	46.0 N	26.9 W	18	36	40	5 NM	02	1006.5	17.3	17.8	4	16.5	36	7	26
HARKNESS TAGS 32	NFDT	14	16.5 N	74.9 W	00	15	M 35	10 NM	18	1012.5	25.0	26.7	5	5	14	< 6	6.5
OCEAN BRAVE	7LSP	14	39.2 N	56.5 W	18	01	M 35	10 NM	01	1011.5	22.0	23.0	11	6.5	35	11	8
AMERICAN ALLIANCE	KFEM	18	33.8 N	77.1 W	12	06	40	10 NM	03	1013.5	24.5	29.0	3	5	06	8	16.5
WESTERN SUN	KEHJ	19	29.3 N	78.2 W	12	18	35	10 NM	02	1009.1	27.7	29.5	3	5	18	6	6.5
SEALAND INDEPENDENCE	WGJC	19	31.3 N	77.9 W	12	16	M 38	5 NM	16	1009.0	28.0	27.0	2	5	17	< 6	10
SANTA ELENA	WLGR	19	30.7 N	75.7 W	18	22	40	5 NM	03	1005.1	27.8	28.9	5	13	22	6	16.5
ALASKAN	WIGD	20	33.0 N	77.8 W	00	19	38	5 NM	15	1003.0	26.2	26.1	3	13	19	9	16.5
MORMACSEA	WEBM	20	29.8 N	76.6 W	12	23	35	5 NM	25	1012.5	26.7	28.9	5	3	23	8	6.5
SEALAND ADVENTURER	KSLJ	20	40.4 N	58.1 W	12	05	M 20	10 NM	03	1020.0	23.0	24.0	5	1.5	36	11	36
EXXON HUNTINGTON	WEAJ	20	38.6 N	74.2 W	17	06	40	5 NM	02	1013.9	21.4	25.0	5	10	06	7	14.5
SEALAND EXPRESS	KGJD	20	36.5 N	74.1 W	18	06	40	5 NM	03	1014.2	23.0	22.0	6	13	06	6	13
MT MITCHELL	WTEG	20	37.2 N	76.0 W	18	02	M 35	5 NM	03	1012.0	22.0	24.5	6	5	00		0
HOUSTON	WFZV	20	34.5 N	72.0 W	21	22	50	5 NM	07	1003.8	27.2	27.8	7	16.5			
MARDI GRAS	3EQN	20	37.7 N	67.4 W	21	10	35	2 NM	82	1008.0	20.6	23.8	7	16.5	11	9	16.5
SEALAND EXPRESS	KGJD	21	36.6 N	74.7 W	00	01	M 36	5 NM	25	1012.7	21.0	24.0	6	10	30	12	19.5
SANTA FE	LUGH	21	34.7 N	69.7 W	03	25	40	10 NM	03	1003.0	27.0	30.0	11	16.5			
HOUSTON	WFZV	21	35.3 N	72.5 W	06	34	42	5 NM	07	1012.5	25.6	27.7	7	16.5			
ESSO PALM BEACH	HPIO	21	38.2 N	74.6 W	06	03	M 38	> 25 NM	02	1017.5	19.0						
MARDI GRAS	3EQN	21	35.1 N	66.2 W	09	22	40	10 NM	80	1005.0	26.0	26.9	12	21	21		19.5
DORIC	3FYT	21	35.6 N	68.2 W	12	31	M 40	10 NM	02	1007.0	26.0	27.0	6	13	31	6	13
PORINQUEN	KPCV	21	36.4 N	73.9 W	12	03	35	10 NM	02	1016.5	24.4	27.7	5	14.5	05	8	14.5
MOBIL ENGINEER	5LWB	21	12.8 N	60.1 W	15	08	40	5 NM	65	1006.0	26.3	23.0	3	5	08	< 6	8
SEALAND INDEPENDENCE	WGJC	21	37.2 N	57.4 W	18	18	M 35	5 NM	02	1012.0	28.0	25.0	3	5	15	11	6.5
OLEANDER	PJYG	22	37.4 N	70.9 W	00	03	25	10 NM	03	1020.2	24.0		8	11.5	XX		24.5
SEALAND INDEPENDENCE	WGJC	22	40.1 N	52.1 W	09	04	M 50	2 NM	82	1004.0	17.5	21.0	2	10	09	< 6	16.5
EXPORT CHALLENGER	WLSG	22	39.2 N	50.4 W	12	21	40	1 NM	64	1001.1	23.3	25.6	10	32.5	21	10	32.5
EXPORT CHALLENGER	WLSG	23	38.2 N	52.9 W	00	03	21	10 NM	02	1016.3	20.0	25.6	8	13	04	10	26
SEALAND PACER	KSLB	23	36.0 N	69.5 W	18	23	M 36	10 NM	02	1012.9	27.7	26.1	5	3	23	6	5
DORIC	3FYT	23	36.3 N	65.9 W	18	23	M 35	5 NM	02	1010.0	26.0	26.5	3	8			
WILMINGTON GETTY	KTKX	23	39.9 N	37.8 W	22	17	47	5 NM	07	0999.2	22.0	23.4	4	19.5	20	10	24.5
WILMINGTON GETTY	KTKX	24	39.8 N	39.3 W	06	23	42	5 NM	13	0985.8	23.0	23.3	4	14.5	25	9	19.5
EXPORT CHALLENGER	WLSG	24	38.6 N	62.5 W	06	23	40	5 NM	01	1004.0	25.6	26.1	6	10	23	6	10
SEALAND PACER	KSLB	24	37.9 N	62.8 W	12	29	M 35	10 NM	02	1011.5	21.5	26.1	5	6.5	29	6	8
RODRIGUES CABRILHO	CSDU	24	39.2 N	61.5 W	12	26	35	2 NM	80	1008.0	24.0	28.0					
WILMINGTON GETTY	KTKX	25	40.2 N	47.2 W	18	31	37	5 NM	03	1007.2	22.0	22.3	5	6.5	31	8	16.5
DALLAS WHEC 716	NPCR	26	47.7 N	41.9 W	06	06	M 45	2 NM	02	0997.4	16.7	20.0	4	8			
ORCO MINER	ELGI	26	43.9 N	34.9 W	18	25	35	10 NM	15	1009.0	23.5	21.0	5	13	25	8	16.5
DALLAS WHEC 716	NPCR	27	50.3 N	38.5 W	00	30	M 46	5 NM	02	1009.1	12.8	16.7	6	10			
TFL EXPRESS	9VPU	27	50.9 N	21.0 W	12	17	M 35	5 NM	11	1011.0	19.5	17.0	4	1.5	20	8	8
TFL EXPRESS	9VPU	28	50.8 N	25.9 W	01	31	M 40	1 NM	07	1016.0	14.0	11.6	5	5	31		8
GLOMAR CHALLENGER	WNCU	28	56.3 N	23.5 W	06	34	M 35	10 NM	02	1015.6	11.7	14.5	5	3	XX		6.5
KNORR	KCEJ	28	59.9 N	41.2 W	06	24	M 35	5 NM	03	1004.0	7.2	7.4	4	8	24	< 6	11.5
GREAT LAKES VESSELS																	
JOHN DYKSTRA	9852	15	47.4 N	87.3 W	12	36	M 36	10 NM	01		.	16.0	6	5			
		SEP.															
MARIA U	5MUC	3	29.7 N	63.4 W	00	23	M 42	5 NM	15	1003.1	28.5	29.0	8	13	23	8	14.5
ITALICA	IBKL	8	41.0 N	50.1 W	15	23	50	2 NM	03	1000.0	24.0	24.0	5	6.5	22	13	6.5
THOMAS NELSON	WEIL	10	58.1 N	18.5 W	12	31	45	.25 NM	62	0982.0	11.2	12.8	8	19.5			
DALLAS WHEC 716	NPCR	10	49.6 N	06.1 W	12	20	M 43	1 NM	10	1003.5	18.3	13.9	5	5			
AMERICA	WY05902	10	24.1 N	74.0 W	15	17	44	2 NM	63	1012.0	25.6		5	6.5	17	7	11.5
AMERICAN LEGACY	KFGJ	10	50.8 N	20.4 W	18	31	41	10 NM	02	1007.0	21.7	18.3	9	16.5	31	9	16.5
VALLEY FORGE	WRBL	18	31.0 N	79.0 W	06	17	46	10 NM	03	1015.9	26.7	30.0	2	1.5	08		
KARINITA	LJBI	20	38.7 N	67.1 W	00	25	M 50	10 NM	01	1004.0	19.5						
GULF SHIPPER	KEMP	20	45.4 N	30.5 W	06	32	45	10 NM	02	1011.0	15.0	17.8	3	11.5	31	< 6	19.5
AMERICAN LEGEND	KFEY	23	49.8 N	40.3 W	12	27	45	5 NM	18	1015.0	12.5	15.0	5	10	27	8	
SALVADOR	LGXS	24	36.3 N	73.0 W	12	31	56	> 25 NM	02	1002.0	19.0						
TILLIE LYKES	WOOP	25	44.2 N	26.2 W	12	33	45	10 NM	01	1010.0	17.8	17.8	4	5	33	9	10
SEALAND INDEPENDENCE	WGJC	25	37.3 N	62.0 W	12	29	M 30	10 NM	01	1014.0	22.0	23.0	3	1.5	29	6	32.5
SEALAND INDEPENDENCE	WGJC	26	39.6 N	57.7 W	00	29	M 30	10 NM	02	1011.0	21.0	24.0	3	1.5	29	6	32.5
TILLIE LYKES	WOOP	26	48.3 N	20.5 W	12	31	45	10 NM	01	1005.0	12.3	16.1	4	5	33	9	10
AMERICAN ARCHER	KFCS	27	48.5 N	45.5 W	12	24	43	5 NM	07	0987.5	8.8	12.2	4	6.5	22	< 6	16.5
AMERICAN ARCHER	KFCS	28	47.4 N	49.8 W	00	29	50	5 NM	07	1003.6	7.7	8.8					
SEALAND PRODUCER	WJBJ	30	31.3 N	45.6 W	00	21	45	5 NM	02	1010.0	25.5	24.0	5	13	25	10	16.5
GREAT LAKES VESSELS																	
JOHN DYKSTRA	9852	27	47.0 N	91.5 W	00	27	M 42	10 NM	02		12.0	14.0		10			
EDWARD L RYERSON	9878	27	47.0 N	90.4 W	12	25	M 42	> 25 NM	03		12.0	11.0		8			
SAMUEL MATHER	9874	27	47.6 N	89.3 W	18	27	M 43	> 25 NM	03		7.0	8.0	8	10			
BENJAMIN F FAIRLESS	9803	27	47.4 N	87.9 W	18	26	M 45	10 NM	02		7.0	13.0	5	8			
HERBERT C JACKSON	9897	28	46.9 N	85.8 W	00	30	M 48	10 NM	02		7.0	10.0	5	10			
WILLIAM CLAY FORD	9888	28	47.2 N	86.7 W	00	29	M 50	10 NM	02		7.0	9.0		11.5			

+ Direction for sea waves same as wind direction
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 35 kn or waves ≥ 25 ft from May through August (≥ 41 kn or ≥ 33 ft, September through April). In cases where a ship reported more than one observation a day with such values, the one with the highest windspeed was selected.

North Pacific Selected Gale and Wave Observations

July, August and September 1981

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves Period sec.	Sea Waves Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
NORTH PACIFIC OCEAN		JULY															
MARITIME JUSTICE	3FVD	1	52.0 N	166.6 E	00	29	M 35	10 NM	03	0990.0	1.0	4.0	6	16.5	30	7	18
VAN FORT	DSDW	1	13.5 N	120.2 E	09	16	M 60	200 YD	02	1008.0	25.5	30.0			18		19.5
AMERICA SUN	WNEJ	1	52.2 N	136.9 W	18	19	M 38	.5 NM	10	1014.5	14.0	12.2	3	6.5	18	6	8
AMERICA SUN	WNEJ	2	51.2 N	135.8 W	00	18	M 45	.5 NM	10	1013.5	10.0	12.2	3	6.5	18	6	8
SEALIFT ARABIAN SEA	NFMQ	2	23.6 N	133.1 E	00	05	38	10 NM	02	1005.0	27.2	29.7	8	14.5	04	8	19.5
PRESIDENT FILLMORE	KRDH	2	54.2 N	167.1 W	12	07	35	10 NM	00	1022.2	7.2	10.0	5	5	28	6	1.5
SEALAND MARINER	KGJF	2	40.3 N	126.8 W	12	36	M 35	5 NM	02	1017.0	14.0	11.0			31		
ARCO SAG RIVER	WLDF	2	41.0 N	126.2 W	12	35	M 36	10 NM	02	1012.0	15.5	11.1	4	6			
KENAI	WSNB	2	42.0 N	127.0 W	18	35	39	5 NM	02	1013.3	15.6	12.8	4	8	35	< 6	10
HOMSING BREEZE	3LOU	3	54.3 N	159.9 W	00	28	M 35	10 NM	02	1016.9	12.0	9.0	7	21	30	9	28
MARITIME JUSTICE	3FVD	3	47.8 N	155.8 E	00	31	M 37	5 NM	38	1004.5	- 0.0	4.0	6	13	32	7	13
MOBILE MERIDIAN	KGSM	3	58.7 N	141.5 W	16	27	M 25	10 NM	01	1005.8	13.4	12.3	3	6.5	27	7	26
SAMOA	OXTZ	5	50.1 N	178.3 E	06	25	35	5 NM	00	1010.5	8.4	9.0	7	14.5			
SOUTH EXPRESS	A8WR	6	53.8 N	159.7 W	18	27	M 36	10 NM	50	1015.5	10.0	9.0	5	13	27	8	13
AMERICA SUN	WNEJ	7	39.5 N	124.4 W	16	35	M 45	> 25 NM	00	1020.1	15.0	11.1	3	5	35	6	6.5
TRINITY	KYRH	8	22.0 N	106.9 W	16	12	45	1 NM	52	1009.5	25.0	29.5	3	5	11	8	10
LAUREL	H8DE	9	49.8 N	172.0 W	06	34	M 35	10 NM	02	1005.5	12.0	8.0	3	8	34	6	10
CLOVER	A8GP	10	33.2 N	136.1 E	06	18	M 46	10 NM	02	1010.7	30.0	27.0	5	5	14	7	5
ARCO ANCHORAGE	WCIO	11	37.3 N	123.8 W	16	32	M 20	> 25 NM	02	1015.4	14.6	13.9	4	8	33	6	32.5
MANULANI	KNIJ	14	37.0 N	125.3 W	12	33	36	10 NM	01	1016.5	15.0	15.0			33		
ARCO PRESTIGE	WLDU	16	17.7 N	100.7 W	12	11	35	10 NM	25	1011.0	25.0	28.3	2	8			
KEYSTONER	KIGR	18	19.9 N	106.5 W	00	16	35	10 NM	02	1007.6	28.9	28.3	2	5	16	< 6	6.5
LNG TAURUS	WDZW	16	23.6 N	128.5 E	12	12	M 49	5 NM	80	1001.0	27.0	28.9	4	19.5	12		19.5
LNG TAURUS	WDZW	19	21.4 N	129.2 E	00	17	M 40	5 NM	62	1008.0	26.0	28.3	4	13	17	7	16.5
PRESIDENT PIERCE	WUBV	19	26.8 N	124.2 E	00	06	38	5 NM	02	1000.0	28.3	26.7	6	13	12	7	29.5
SEALAND PATRIOT	KHRF	19	28.3 N	127.5 E	06	10	M 36	5 NM	10	1006.3	29.8	27.0	5	8	18	9	13
PRESIDENT TAFT	WLDT	19	44.8 N	155.2 E	23	20	35	50 YD	44	1006.5	10.0	8.9	3	6.5	20	>13	8
PRESIDENT TAFT	WLDT	20	42.0 N	150.4 E	12	21	38	2 NM	41	1000.9	14.4	10.6	3	5	18	>13	6.5
PERENNIAL ACE	HOMG	20	49.8 N	163.1 E	21	92	M 61	.25 NM	20	1003.5	11.0	10.0	2	1.5	23	< 6	3
SEALAND DEVELOPER	KHRH	21	38.9 N	125.3 W	16	35	M 36	5 NM	02	1017.1	15.0	16.0	3	13	35	7	14.5
AMERICA SUN	WNEJ	22	39.5 N	125.2 W	06	34	M 45	5 NM	07	1016.0	14.0	10.0	4	6.5	34	7	8
PRESIDENT FILLMORE	KRDH	22	51.9 N	149.2 W	12	15	35	5 NM	55	1024.0	12.8	10.6	5	5	15	8	6.5
ARCO ALASKA	WSBK	22	39.1 N	124.7 W	16	33	M 35	5 NM	01	1012.9	13.9	10.0	6	11.5			
ARCO SAG RIVER	WLDF	23	40.5 N	126.3 W	00	36	M 40	10 NM	02	1017.5	17.8	12.3	5	19.5	[illegible]		19.5
AMERICA SUN	WNEJ	23	44.2 N	179.6 W	06	35	M 35	5 NM	02	1025.5	16.0	14.4	4	5	35	6	8
PACIFIC ERA	ELUD	23	42.6 N	148.7 W	06	17	35	2 NM	60	1023.0	17.0	17.0	8	13	16	8	13
CHEVRON COLORADO	KLHZ	24	39.6 N	125.0 W	06	34	M 50	5 NM	05	1017.1	13.3		6	8	35	< 6	20
CHEVRON LOUISIANA	WHNG	24	39.9 N	125.0 W	12	35	M 42	5 NM	02	1015.6	12.8		2	3	35	6	19.5
PRESIDENT VAN BUREN	WWPI	25	39.1 N	125.2 W	00	34	38	5 NM	10	1015.2	15.0	14.4	2	3	34	< 6	10
CHEVRON COLORADO	KLHZ	25	44.3 N	175.0 W	06	35	M 30	> 25 NM	02	1021.1	13.9		2	6.5	36	< 6	24.5
MOBIL ARCTIC	KSPY	25	38.9 N	124.9 W	12	32	40	2 NM	02	1012.5	14.5	11.7	3	10	32	8	13
EXXON PHILADELPHIA	WNFJ	25	40.8 N	176.3 W	16	36	M 35	10 NM	02	1018.0	17.8	17.2	9	16.5			
KOFUKU MARU	JALB	25	52.8 N	170.9 E	18	16	M 35	.25 NM	60	1007.0	10.2	9.0	7	10	16	7	10
WASHINGTON WOOD	JEOV	25	48.4 N	170.6 W	18	32	M 45	5 NM	12	1025.9	15.5	13.8	5	11.5	32	< 6	11.5
KOFUKU MARU	JALB	26	51.5 N	167.3 E	06	24	M 35	.25 NM	40	1003.2	12.0	9.0	6	10	24	6	10
MOBIL ARCTIC	KSPY	26	40.7 N	176.2 W	06	34	45	2 NM	07	1014.5	15.0	12.0	5	10	33	8	11.5
TENNESSEE	LFEI	26	49.1 N	127.1 W	18	33	M 38	> 25 NM	40	1023.0	17.5	13.0					
DISCOVERER OSS	WTEA	26	58.8 N	174.3 W	16	16	M 36	5 NM	63	1000.9	9.7	9.3	6	13	17	6	8
MOBIL ARCTIC	KSPY	27	44.0 N	179.0 W	06	01	35	5 NM	01	1022.0	15.0	14.4	4	8	36	8	10
WASHINGTON WOOD	JEOV	28	53.6 N	153.6 W	16	27	M 35	5 NM	41	1028.5	12.9	11.1	5	5	27	< 6	5
WASHINGTON WOOD	JEOV	29	53.8 N	155.8 W	00	23	M 35	5 NM	03	1026.0	13.0	11.7	5	5	23	< 6	5
AUSTRAL ENDURANCE	KIRF	30	38.3 N	124.5 W	00	36	35	10 NM	02	1015.6	17.2	13.9	2	11.5	36	< 6	19.5
LNG TAURUS	WDZW	30	32.8 N	177.2 E	06	11	M 40	5 NM	02	1011.0	30.5	23.9	8	24.5	14	12	29.5
RODASARI DUA	PLYA	30	10.5 N	173.1 E	12	25	M 35	2 NM	50	1006.3	27.6	30.5	7	16.5	23	7	16.5
OGDEN JORDAN	A8PZ	30	32.8 N	173.5 E	18	11	M 41	10 NM	02	1003.0	28.0	26.0					
		AUG.															
AMERICAN LIBERTY	WZJD	1	14.2 N	146.4 E	12	23	35	10 NM	03	1003.0	27.6	27.8	8	14.5	25	>13	14.5
SEALAND FREEDOM	WGJW	2	44.5 N	149.0 W	12	31	M 35	10 NM	80	1026.0	16.5	18.0	4	5	32	6	8
SNOWFLOWER	SLMA	3	18.7 N	155.3 W	06	07	40	10 NM	02	1010.0	25.5			11.5	09		6.5
PRESIDENT MADISON	WCIP	3	16.4 N	149.3 E	06	18	37	10 NM	03	1003.5	28.9	27.2		8	24	6	11.5
LONG BEACH	HOEJ	3	33.4 N	148.1 E	18	11	48	< 50 YD	03	0999.3	25.0	24.0	15	8	11	>13	24.5
DIAMOND PHOENIX	DSMS	3	32.4 N	147.8 E	18	09	M 58	2 NM	65	0986.5	24.0	25.5	21	19.5	09	>13	19.5
LONG BEACH	HOEJ	4	33.4 N	146.4 E	00	11	48	200 YD	03	0998.1	27.0	24.0	15	10	11	10	19.5
SNOWFLOWER	SEMA	4	15.0 N	142.7 W	18	06	M 36	10 NM	02	1010.5	27.6			6.5	10		8
SNOUPORD	LION	4	37.7 N	145.8 E	16	07	35	2 NM	81	0997.0	21.0		5	13	[illegible]		19.5
SEALAND LIBERATOR	WHPP	4	39.0 N	147.9 E	18	10	M 43	5 NM	02	0990.5	23.5	22.0	3	19.5	16	>13	19.5
CHUEN ON	H3GX	5	39.4 N	150.9 E	00	13	M 26	1 NM	40	0998.0	23.5	23.5	7	29.5	13	7	29.5
MING MOON	PLMG	5	44.9 N	156.8 W	00	26	M 35	10 NM	02	1018.4	16.0	15.0	7	6			
GARDENIA	A8UA	5	41.5 N	153.5 E	06	13	M 35	2 NM	03	1006.0	23.0	21.0	8	18	15	6	11.5
SEALAND LIBERATOR	WHPP	5	36.7 N	143.8 E	06	29	M 35	5 NM	28	0984.0	23.0	23.0	6	11.5	31	13	19.5
SNOUPORD	LION	5	36.7 N	147.4 E	06	12	45	.5 NM	81	0995.0	23.0	22.0	[illegible]	16.5	12	12	23
DAWN	WLDP	5	42.0 N	146.7 E	12	09	35	2 NM	52	0986.1	21.1	16.2	4	6.5	12	10	32.5
YOUNG SCOPE	6ZLM	5	40.4 N	147.8 E	12	14	M 36	2 NM	64	0985.5	21.0	21.0					
WASHINGTON WOOD	JEOV	5	40.1 N	146.1 E	12	09	M 50	200 YD	02	0985.9	20.5	18.7	5	6.5	09	< 6	11.5
FRIENDSHIP	ELXP	5	44.3 N	151.9 E	18	11	M 40	200 YD	45	1004.5	16.0	12.0	6	32.5	14	7	13
CHUEN ON	H3GX	6	41.3 N	156.5 E	00	12	M 22	10 NM	10	1008.3	21.0	21.9	6	24.5	12	6	24.5
DAWN	WLDP	6	42.0 N	149.0 E	00	19	15	2 NM	41	0994.2	18.8	12.2	4	6.5	13	10	29.5
GREEN HOPE	JNRY	6	47.1 N	165.1 E	03	25	M 43	2 NM	07	1004.0	14.0	14.0	8	13	25	13	19.5
JAPAN APOLLO	JKZL	6	51.4 N	174.9 W	06	32	M 35	5 NM	02	1009.5	10.0		7	10	30	7	10
PHILIPPINE CORREGIDOR	DZRS	6	36.9 N	150.7 W	16	20	M 48	.2 NM	07	1008.5	21.9	25.0	10	13	20	10	14.5
PHILIPPINE CORREGIDOR	DZRS	7	39.0 N	152.3 W	00	21	M 36	5 NM	03	1007.0	24.0	26.0	10	11.5	21	8	13
OAKLAND	H3CE	7	46.7 N	146.5 W	00	09	40	.5 NM	62	1008.5	17.5	14.0	5	10	09	9	29.5
SINALOA	OXNS	7	51.2 N	147.4 W	12	14	M 35	5 NM	63	1023.0	14.5	12.4	6	6.5			
SEALAND COMMERCE	WEUJ	7	51.5 N	145.1 W	16	17	35	< 50 YD	46	1009.0	14.0	11.7		10			
EXXON NEW ORLEANS	WNDM	7	46.1 N	130.7 W	18	33	M 40	10 NM	02	1025.7	19.0	16.7	2	6.5	36	7	6.5
EXXON NEW ORLEANS	WNDM	8	47.3 N	171.3 W	00	34	M 40	10 NM	11	1026.2	17.0	17.2	2	5	36	< 6	6.5
SEALAND COMMERCE	WLUJ	8	51.2 N	141.4 W	06	18	35	5 NM	07	1019.0	15.5	11.1		13			
SINALOA	OXNS	8	51.1 N	143.0 W	00	15	P 35	5 NM	53	1017.7	15.3	12.2	6	8	19	10	14.5
EXXON BATON ROUGE	WAFA	8	55.9 N	141.0 W	00	18	35	5 NM	53	1019.5	16.0	12.8	4	5	16	7	11.5
HANJIN POHANG	D8OH	10	50.4 N	163.9 W	00	22	M 35	5 NM	02	1010.0	13.5	14.0	6	10	22	>13	6.5
MIKAWA MARU	JUMS	10	50.4 N	156.9 W	06	18	M 35	2 NM	62	1017.0	12.5	12.5	3	8	21	6	10
PHILADELPHIA	WJGO	10	53.2 N	134.3 W	12	32	M 35	10 NM	50	1026.1	14.4	16.1	4	5	32	< 6	11.5
PRESIDENT TAFT	WLDT	10	50.1 N	129.8 W	18	31	40	.5 NM	28	1020.0	13.9	10.6	4	6	30	6	8
VAN CONQUEROR	A8IB	10	48.5 N	126.2 W	18	33	M 35	2 NM	02	1018.0	15.0	18.0					
HANJIN POHANG	D8OH	11	50.8 N	175.4 W	00	23	M 46	2 NM	24	1014.0	13.0	13.0	7	11.5	23	< 6	8
PRESIDENT TAFT	WLDT	11	50.9 N	173.1 W	00	31	35	10 NM	01	1024.0	14.1	15.6	4	8	34	< 6	16.5
PERENNIAL ACE	HOMG	12	53.9 N	154.9 W	09	23	M 35	5 NM	02	1016.3	12.0	13.0	2	3	25	< 6	5
EVER VALUE	H3RH	13	39.2 N	165.9 W	06	05	M 45	10 NM	02	1031.7	18.5	18.0	5	5	14	6	5
PERENNIAL ACE	HOMG	13	54.2 N	169.6 W	21	23	M 35	2 NM	51	1011.0	11.0	10.0	2	5	24	< 6	6.5
WORLD HERCULES	JKVA	14	54.4 N	165.9 W	06	25	M 35	2 NM	62	1007.0	8.0	11.0	4	13			
MASON LYKES	KNFN	16	34.6 N	140.8 E	06	03	35	10 NM	03	1009.8	24.4	26.1	3	5	03	< 6	6.5
PRESIDENT PIERCE	WUBV	16	20.0 N	155.4 E	06	22	44	5 NM	02	1001.7	28.9	27.8	4	10	22	6	11.5
LAKE ARROWHEAD	6ZYP	16	17.5 N	131.4 E	12	27	35	.5 NM	82	0995.0	27.0	25.0	4	13	28	8	13

Vessel	Nationality	Date	Position of Ship: Lat. deg.	Position of Ship: Long. deg.	Time GMT	Wind: Dir. 10°	Wind: Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C: Air	Temperature °C: Sea	Sea Waves*: Period sec.	Sea Waves*: Height ft.	Swell Waves: Dir. 10°	Swell Waves: Period sec.*	Swell Waves: Height ft.
NORTH PACIFIC OCEAN		AUG.															
LAKE ARROWHEAD	6ZYP	17	16.8 N	132.3 E	00	25	38	2 NM	92	0998.0	27.0	26.0	8	16.5	00		0
PRESIDENT PIERCE	WUBV	17	17.4 N	151.1 E	03	24	35	5 NM	60	1005.1	28.3	26.7	3	8	24	6	14.5
AMERICA SUN	WNEJ	17	35.6 N	121.5 W	12	33	M 40	5 NM	03	1010.8	13.3	14.4	5	8	33	< 6	8
EXXON HOUSTON	KHBA	17	52.9 N	138.6 W	18	19	10	10 NM	21	1021.1	16.5	14.4	6	24.5	27	8	6.5
LAKE ARROWHEAD	6ZYP	18	19.3 N	136.1 E	00	21	37	1 NM	81	0996.0	25.0	26.0	4	13	21	6	16.5
SEALAND COMMERCE	WEUJ	19	47.3 N	174.2 W	06	26	35	.5 NM	10	1006.7	12.5	12.2	5	6	22	8	
ORIENTAL STATESMAN	ELRE	19	44.6 N	167.9 W	06	22	M 44	200 YD	45	1017.0	17.0	16.0					
PRESIDENT TAFT	WLDT	20	32.6 N	135.1 E	00	07	40	10 NM	02	1004.0	28.3	28.3	3	8	18	< 6	8
MOBILE MERIDIAN	KGSM	20	57.9 N	141.7 W	03	16	47	5 NM	82	0982.3	13.7	12.8	6	19.5			
PRESIDENT TAYLOR	WJGH	20	54.0 N	163.1 W	12	29	41	10 NM	02	1009.5	9.5	12.7	5	8	XX		
LESLIE LYKES	WHTU	20	52.5 N	157.2 W	12	30	35	10 NM	00	0996.6	9.4	11.1	6	11.5	29	8	21
SAPPHIRE	5MYK	20	43.8 N	166.3 E	12	12	M 35	.25 NM	65	1000.0	19.5	18.0	5	11.5	05	6	13
DIAMOND PHOENIX	DSMS	20	48.2 N	168.0 E	12	10	M 38	1 NM	51	1013.6	12.3	14.0	6	6.5	10	7	8
CHEVRON ARIZONA	KGRE	20	53.6 N	139.7 W	12	19	M 35	5 NM	03	0999.3	13.9		3	6.5	18	< 6	11.5
OVERSEAS CHICAGO	KBCF	20	52.9 N	149.8 W	18	25	30	5 NM	02	0984.5	11.7	12.6	5	32.5			
REISHU MARU	JDRD	20	51.8 N	155.2 W	18	30	M 35	2 NM	03	0998.0	11.5	6.5	5	11.5	32	10	19.5
GARDENIA	AGUA	20	54.0 N	156.2 W	18	32	M 43	2 NM	03	0993.5	12.0	13.0	7	21	29	8	26
PRESIDENT PIERCE	WUBV	20	17.8 N	130.0 E	18	25	35	10 NM	02	1005.8	27.8	27.8	3	8	25	6	11.5
SEALAND COMMERCE	WEUJ	20	45.9 N	167.5 E	18	12	38	1 NM	61	0998.0	16.5	12.2	6	10	18	11	10
AMERICA SUN	WNEJ	20	53.1 N	137.6 W	18	16	M 38	1 NM	20	1000.0	14.4	14.4	2	5	24	< 6	8
SEALAND COMMERCE	WEUJ	21	45.3 N	164.7 E	00	11	35	5 NM	41	0997.0	16.5	12.8	XX	10	XX		
SEALAND FINANCE	WJKG	21	52.0 N	156.0 W	00	29	35	5 NM	02	1002.0	14.4	9.4	8	16.5	30	>13	19.5
GARDENIA	AGUA	21	54.0 N	157.3 W	00	29	M 42	2 NM	02	0996.5	13.0	13.0	7	21	29	8	26
DIAMOND PHOENIX	DSMS	21	49.0 N	172.0 E	00	11	M 38	1 NM	21	1010.8	13.5	12.5	6	6.5	11	7	8
OVERSEAS CHICAGO	KBCF	21	51.7 N	149.8 W	00	28	40	5 NM	02	0996.0	12.2	12.8		29.5	27		32.5
JAPAN RAINBOW	JPVJ	21	50.3 N	161.1 W	00	30	M 35	10 NM	01	1015.5	14.5	10.0	8	8	30	12	11.5
LESLIE LYKES	WHTU	21	51.2 N	149.0 W	06	27	35	10 NM	02	0998.2	9.4	12.2	8	19.5	26	9	26
PRESIDENT WILSON	WNPD	21	51.9 N	172.0 E	06	13	35	.5 NM	63	1007.0	11.7	12.2	5	13	13	9	16.5
MOBILE MERIDIAN	KGSM	21	57.6 N	141.1 W	06	16	45	2 NM	59	0983.4	13.4	13.4	6	19.5	18	7	19.5
KENAI	WSNB	21	58.7 N	145.7 W	12	13	35	5 NM	02	0975.2	12.2	10.0					
BROOKS RANGE	WSRP	21	35.4 N	171.9 W	18	32	35	10 NM	00	1013.1	21.5	13.3	3	13	33	>13	16.5
KENAI	WSNB	22	57.1 N	142.8 W	00	16	27	10 NM	01	0996.5	13.3	10.0	6	19.5	18	>13	24.5
JAPAN RAINBOW	JPVJ	22	50.0 N	152.3 W	00	27	M 35	5 NM	02	1009.5	12.5	12.0	8	8	28	13	13
GARDENIA	AGUA	22	53.4 N	162.0 W	00	18	M 35	1 NM	03	1013.0	13.5	11.0	6	18	18	8	23
PAN ASIA	3FXN	22	54.1 N	173.5 E	06	23	M 35	1 NM	03	0992.0	13.0	11.0					
BROOKS RANGE	WSRP	22	40.5 N	126.1 W	18	34	35	10 NM	03	1014.5	23.3	17.3	4	10	34	>13	13
VAN CONQUEROR	A8IB	22	34.3 N	142.4 E	18	14	M 55	2 NM	02	0989.2	24.0	24.0					
PACIFIC VENTURE	HOVS	22	36.8 N	143.7 E	18	14	M 48	.5 NM	12	0999.2	28.0	24.0	7	18	14	10	19.5
FARADALE	7CKV	22	41.7 N	141.5 E	21	12	M 40	1 NM	65	0992.9	22.0	18.0	3	13	11	8	24.5
PAN ASIA	3FXN	23	52.9 N	168.6 E	00	26	M 35	2 NM	63	0994.0	11.5	12.0					
PACIFIC VENTURE	HOVS	23	36.5 N	145.4 E	00	34	M 45	50 YD	12	0995.5	27.0	23.0	7	23	18	10	23
WORLD HERCULES	JKVA	23	36.3 N	141.4 E	00	18	M 60	.25 NM	65	0972.0	20.5		6	10	20	< 6	21
VAN CONQUEROR	A8IB	23	34.1 N	143.5 E	00	16	M 42	2 NM	02	0996.0	28.0	26.0					
FARADALE	7CKV	23	41.3 N	140.3 E	03	11	M 48	1 NM	63	0976.3	24.5	23.0	4	14.5	13	6	6.5
SEALAND COMMERCE	WEUJ	23	36.2 N	146.6 E	06	16	45	5 NM	02	1003.5	27.0	24.4	4	16.5	16	6	13
PRESIDENT JOHNSON	WVMS	23	46.5 N	174.5 E	18	29	35	5 NM	03	1002.3	13.3	12.2	10	10	31	11	10
PRESIDENT JOHNSON	WVMS	24	48.9 N	177.7 E	00	29	35	2 NM	62	0998.2	12.8	11.7	8	8	30	10	13
EASTERN FORTUNE	ELNZ	24	34.1 N	146.4 E	00	18	M 35	5 NM	00	1009.0	27.0		7	23			
VERRAZANO BRIDGE	JAXJ	26	42.5 N	170.3 W	18	17	M 36	1 NM	65	0996.5	17.5		3	6.5	30	7	11.5
VERRAZANO BRIDGE	JAXJ	27	42.5 N	167.6 W	00	17	M 39	1 NM	61	0998.4	18.5	16.5	4	6.5	18	6	11.5
MOBILOIL	WHTO	27	37.4 N	123.3 W	12	32	M 38	10 NM	02	1011.5	12.8	14.5	8	8	32	6	11.5
WASHINGTON WOOD	JEOV	27	49.0 N	141.5 W	18	14	M 40	2 NM	11	1003.5	13.0	11.0	5	5	14	< 6	5
SANKOSTEEL	ELSN	27	37.1 N	125.9 W	23	33	M 36	5 NM	02	1015.0	18.0	20.0	7	13	33	8	14.5
MOBILOIL	WHTO	28	39.8 N	125.5 W	00	34	36	10 NM	02	1013.5	16.2	15.6	10	19.5	33	8	11.5
WASHINGTON WOOD	JEOV	28	49.0 N	159.2 W	00	14	M 35	1 NM	47	1006.5	13.0	11.0	5	5	14	< 6	5
ORIENTAL SOVEREIGN	ELUH	28	51.4 N	163.0 W	00	14	M 37	< 50 YD	10	1002.6	14.0	11.5	7	13	14	7	11.5
SANKOSTEEL	ELSN	28	36.0 N	127.2 W	05	32	M 38	5 NM	03	1016.0	17.0	17.0	7	13	32	8	14.5
AMERICAN CORSAIR	WICE	28	19.4 N	105.5 W	19	02	40	1 NM	80	0993.3	23.3	28.9	8	11.5	XX		8
SCANDINAVIAN HIGHWAY	JJTK	29	36.5 N	152.9 W	12	19	M 40	10 NM	02	1011.0	22.0						
WASHINGTON WOOD	JEOV	29	47.8 N	143.1 W	18	12	M 40	> 25 NM	03	1014.0	14.5	13.7	5	3	12	< 6	5
WASHINGTON WOOD	JEOV	30	47.0 N	138.6 W	06	14	M 35	5 NM	80	1013.5	15.5	14.9	5	5	14	< 6	5
SEALAND EXPLORER	WGJF	30	27.6 N	121.3 E	15	04	M 39	5 NM	81	0991.8	29.0	29.0					
PRESIDENT MADISON	WCIP	30	24.6 N	123.0 E	18	29	38	5 NM	21	0989.3	26.7	27.2		13			13
PRESIDENT FILLMORE	KRDH	31	45.7 N	157.0 E	00	01	35	2 NM	40	0998.5	14.4	15.0	4	6.5	24	6	11.5
PRESIDENT MADISON	WCIP	31	26.7 N	125.9 E	06	20	50	.25 NM	61	0989.0	24.4	27.2	6	23	24		
NORTH PACIFIC OCEAN ENVIRONMENTAL BUOYS		AUG															
46003		20	52.0N	156.0W	17	31	M38			999.8	11.5	12.3	1	13			
46003		21	52.0N	156.0W	02	29	M38			1001.8	10.7	12.0	1	12			
NORTH PACIFIC OCEAN		SEP.															
SELANDIA	OYAT	1	29.4 N	126.7 E	06	17	M 52	.5 NM	65	0998.0	26.0	28.0	10	29.5			
PRESIDENT MC KINLEY	WVFZ	1	32.1 N	128.9 E	18	14	45	10 NM	02	1003.8	27.8	28.3			15		
FORTUNSTAR	5LUW	5	45.8 N	160.2 E	12	27	M 42	5 NM	58	1001.3	14.0	13.0					
PRESIDENT TYLER	WEZM	5	47.2 N	156.8 E	15	25	45	2 NM	07	0996.7	9.4	9.4			25		32.5
ADRIAN MAERSK	OYIT	5	48.7 N	157.6 E	18	27	45	1 NM	02	0988.7	11.2			26			
SHUNWIND	ELIQ	5	47.6 N	162.9 E	21	24	M 52	5 NM	07	0998.3	13.0	13.0	8	16.5	23	7	32.5
SHUNWIND	ELIQ	6	47.5 N	162.6 E	00	25	M 44	5 NM	07	1000.5	12.5	13.0	8	16.5	25	7	32.5
ADRIAN MAERSK	OYIT	6	47.8 N	156.3 E	00	27	45	1 NM	02	1005.8	11.4			26			
FORTUNSTAR	5LUW	6	44.8 N	158.4 E	00	29	M 45	10 NM	02	1014.0	16.0	13.0					
AMERICA MARU	JNXV	6	41.9 N	171.1 W	18	26	M 42	5 NM	02	1008.5	16.5	19.0	6	6.5	27	7	13
PACIFIC VENTURE	HOVS	10	51.6 N	137.1 W	18	22	M 42	.5 NM	18	1002.0	16.0	14.0	8	13	23	6	23
TONSINA	KJDG	10	49.6 N	133.9 W	18	21	42	5 NM	21	1013.2	16.7	14.4	7	18	XX		
BROOKS RANGE	WSRP	10	52.4 N	136.0 W	18	25	48	5 NM	16	0999.9	15.6	15.6	6	14.5	23	9	18
SOUTH EXPRESS	A8WR	12	41.4 N	152.3 E	18	22	M 45	2 NM	02	0997.0	22.0	19.0	7	32.5	22	10	29.5
SARGODHA	OUIU	13	46.9 N	168.4 E	12	12	M 41	5 NM	25	1010.7	12.6	15.5	8	13			
BROOKS RANGE	WSRP	14	56.3 N	143.6 W	18	09	55	.5 NM	63	0991.1	12.2	11.7	5	29.5	11	9	37.5
PACIFIC VENTURE	HOVS	15	50.8 N	166.5 E	18	34	M 43	2 NM	03	1008.5	12.0	8.0	3	5	10	< 6	6.5
DISCOVERER OSS	WTEA	16	50.2 N	129.1 W	00	14	M 42	2 NM	02	1008.0	16.0	14.5	5	24.5			
RED ARROW	SLTT	18	50.1 N	137.0 W	00	14	M 50	2 NM	55	0979.5	13.0	15.0	6	32.5	14	10	32.5
ARCO JUNEAU	KSBG	18	50.6 N	134.8 W	06	21	M 45	5 NM	03	0997.5	13.9	11.7	8	14.5	20	11	16.5
B T ALASKA	WFQE	18	56.7 N	141.6 W	12	11	M 46	5 NM	02	0975.4	13.3	13.3	5	13	10	8	16.5
HANJIN POHANG	D8ON	19	48.6 N	151.9 W	18	27	M 45	10 NM	03	1017.0	13.0	13.0	7	11.5	27	6	10
OGDEN SENEGAL	A8FO	19	40.0 N	175.2 E	18	06	M 50	2 NM	02	1012.5	18.0	21.0	5	10	06	8	16.5
HANJIN POHANG	D8ON	20	49.1 N	154.6 W	00	27	M 43	5 NM	80	1015.0	13.5	12.0	6	11.5	27	< 6	8
ARCO CALIFORNIA	WMCV	20	46.2 N	130.7 W	18	27	M 44	5 NM	07	1003.5	16.2	17.6	4	6.5	27	6	16.5
AMERICAN LEGION	WZJC	20	25.2 N	120.7 E	20	05	55	2 NM	02	1002.5	25.6	24.4	4	18	04	>13	19.5
ARCO CALIFORNIA	WMCV	21	46.5 N	131.4 W	00	27	M 45	5 NM	07	1007.5	16.0	13.3	4	6.5	27	< 6	18
EXXON NEW ORLEANS	WNDM	21	45.5 N	130.5 W	00	27	M 55	5 NM	02	1011.0	16.0	17.2	6	10	28	12	16.5
B T ALASKA	WFQE	21	47.4 N	129.7 W	00	27	M 44	5 NM	81	1004.2	12.8	17.2	4	10	27	9	14.5
BLUE OCEAN	JKOM	22	52.0 N	149.0 W	00	30	M 45	5 NM	62	1016.0	12.0	11.0	6	10	30	7	11.5
PRESIDENT FILLMORE	KRDH	28	44.5 N	154.3 E	00	12	40	2 NM	81	0999.0	13.3	13.9	4	11.5	12	9	32.5
DIAMOND PHOENIX	DSMS	28	46.3 N	174.1 E	06	04	M 52	2 NM	21	1000.5	18.0	11.0	6	8	04	8	13
PACIFIC ERA	ELUD	29	34.3 N	168.8 E	00	24	45	2 NM	02	1004.2	24.5	25.0	8	10	25	7	14.5
NORTH PACIFIC OCEAN ENVIRONMENTAL BUOYS		SEP															
46006		18	51.0N	136.0W	01	16	M46			987.4	15.0	14.3	4	17			

* Direction for sea waves same as wind direction.
XX Direction or period of waves indeterminate.
M Measured wind.

NOTE: The observations are selected from those with winds ≥ 33 kn or waves ≥ [illegible] ft from May through August (≥ [illegible] kn or ≥ [illegible] ft, September through April). In cases where a ship reported more than one observation a day with such values, the one with the highest windspeed was selected.

U.S. Cooperative Ship Weather Reports

July, August and September 1981

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY AUGUST SEPTEMBER 1981

SHIP NAME	VIA RADIO	VIA MAIL
ACE ENTERPRISE	7	
ADRIAN MAERSK	30	157
AIMEE LYKES	73	
ALBERT MAERSK	28	58
ALLTRANS ENTERPRISE	24	
AMERICA MARU	125	69
AMERICAN ALLIANCE	32	128
AMERICAN ARGOSY	29	89
AMERICAN CHARGER	1	25
AMERICAN HERITAGE	5	7
AMERICAN LAPA	92	77
AMERICAN LEGION	93	197
AMERICAN RANGER	20	64
AMOCO CAIRO	9	
ANDRE MAERSK	92	34
ANTONIA JOHNSON	17	117
ARCO CALIFORNIA	72	128
ARCO PROGRESS	3	5
ARGONAUT	33	66
ARTHUR MAERSK	24	99
ASIA FLAMINGO	17	
ASIAN EXPRESS	11	108
ATLANTIC RAINBOW	10	192
AUSTRAL ENTENTE	91	53
AUSTRAL PIONEER	67	47
AXEL JOHNSON	18	21
BACAB	6	
BARNEY NAPA	7	
BARNEY TONSBERG	24	37
BAUNE	1	
BERGLJOT	43	80
BLUE OCEAN	60	150
BORINQUEN	70	172
BRIGHT HOPE	15	
BUNGA CHEMPAKA	5	
CALIFORNIA RAINBOW	72	128
CARNIVALE	59	79
CHANCELLORSVILLE	5	
CHARLESTON	77	100
CHAUVENET T AGS 29		124
CHESHIRE	19	85
CHEVRON BURNABY		44
CHEVRON EDINBURGH	13	51
CHEVRON MISSISSIPPI	51	107
CHEVRON PERRIS	1	132
CHIPA	61	
CITRUS WL6760	71	
CLIFFORD MAERSK	22	26
COLUMBUS AMERICA	108	
CONCORDIA STAR	16	17
CORONADO	12	43
CRISTOBAL	33	136
DAFFODIL	30	127
DAVID G. IRWIN	18	29
DEFIANCE	16	36
DEL RIO	19	40
DELAWARE II	125	164
DELTA SUD	10	54
DITTE SKOU	67	110
DONA MAGDALENA		22
DRUME	22	
EASTERN BRIDE	1	99
EASTERN PACIFIC	1	
EASTERN VENTURE	63	73
EL MEXICANO	28	
ENA OLDENDORFF	16	
ESSO PALM BEACH	26	109
EVER SHINE	6	87
EXPORT BANNER	1	
EXPORT TO-HFECE	12	69
EXXON BATON ROUGE	34	51
EXXON GETTYSBURG	5	56
EXXON LEXINGTON	38	109
EXXON SAN FRANCISCO	39	70
FESTAFRO	25	
FORTALEZA	77	137
FRIENDSHIP	26	119
GEMINI	16	
GEORGE L PARKHURST	1	
GLADIOLUS	6	17
GLOMAR PACIFIC	1	
GOLDEN GATE BRIDGE	141	117
GREAT LAND	99	82
GREEN HARBOUR	6	
GUADALUPE	1	
GULF MERCHANT	15	76
H J HAYNES		232
HANJIM INCHEON	17	
HARVEST MARU	102	112
HIKARI MARU	80	37
HOEGH MASCOT	1	12
HOMSING BREEZE	81	145
HOUSTON	10	71
IRACHUS STAR	26	47
IRIS QUEEN	75	
J LOUIS	110	187
JALANTA	1	
JAMES LYKES	28	
JAPAN CRORO	22	77
JOHN K. MCCONE		190
KONCAGUA		10
AFRICAN DAWN	27	78
ALASKA STANDARD	41	54
ALEUTIAN DEVELOPER	25	49
ALLTRANS EXPRESS	26	73
AMERICA SUN	47	230
AMERICAN APOLLO	87	195
AMERICAN ARROW	46	
AMERICAN CHIEFTAIN	43	122
AMERICAN HIGHWAY	30	
AMERICAN LEADER	67	145
AMERICAN LIBERTY	74	152
AMERICAN RELIANCE	22	62
ANCO DUKE	1	
ANNA MAERSK	50	82
AQUARIUS	1	
ARCO FAIRBANKS	67	133
ARCO SAG RIVER	33	113
ARIES	8	
ASHLEY LYKES	23	22
ASIA HERON	21	49
ATHEL LAARKI	29	
AUSTIN	1	
AUSTRAL ENVOY	38	63
AUSTRAL PURITAN	108	11
AXEL MAERSK	42	73
BARNES	2	
BARRER PRIAM	36	81
BARRANCA	115	61
BAY	31	73
BERKSHIRE	20	
BLUEBIRD	95	
BOSTON	29	119
BRILLIANT STAR	15	
BUNGA MELAWIS	29	
CAMPBELL WHEC 32	115	
CECILIE MAERSK	32	66
CHAPMAN	119	112
CHARLOTTE MAERSK	15	35
CHAVEZ	27	67
CHESNUT HILL	15	73
CHEVRON CALIFORNIA	58	99
CHEVRON KEATUCHY	127	
CHEVRON NAGASAKI		107
CHEVRON PERTH	41	261
CHRISTIAN MAERSK	6	31
CITY OF DUNDEE	5	
CLOVER	65	89
COLUMBUS LOUISIANA	46	
CONCORDIA SUN	12	15
COUNCIL GROVE	1	
CRYSTAL REED	3	
DALLAS WHEC 716		96
DAVID P REYNOLDS	142	236
DEL CAMPO	40	108
DEL VALLE	19	35
DELAWARE SUN	10	26
DIAMOND PHOENIX	89	185
DOCEANLPA	7	
DORIC	68	162
E. HORNSBY WASSON	17	67
EASTERN DIAMOND		85
EASTERN RIVER	29	
EASTERN WORLD	41	18
ELIZABETH LYKES	38	
ESSO BAYONNE	13	19
ESSO SAINT JOHN	19	29
EVER SPRING	41	43
EXPORT BUYER	27	
EXPORT FREEDOM	24	30
EXXON BOSTON	8	9
EXXON HOUSTON	32	40
EXXON NEW ORLEANS	29	48
EXXON WASHINGTON	32	71
FESTAVAL	41	61
FORTUNSTAR	15	31
GALLEON AQUAMARINE	8	76
GEN HOYT S VANDENBERG		66
GEORGE M KELLER	53	217
GLOBAL FRONTIER	20	86
GOLDEN ANNE	7	
GOLDEN CHENIL	9	
GREAT OCEAN	9	31
GREEN ISLAND	50	62
GUADALUPE I	14	14
GULF SHIPPER	21	27
HAFA ADAI	1	
HANJIN POHANG	1	43
HECK ASVRI		109
HILLYER BROWN	2	
HOEGH MERIT	6	2
HOLY GLEEN	8	
HOWARD E NESPER	8	63
INGER	34	100
IRONWOOD WLB 297	5	
J W GRAY	2	
JALAYAPINI	28	
JAPAN ACE	149	63
JAPAN RAINBOW	15	17
JOHN HENRY		96
ADABELLE LYKES	76	
AFRICAN STARS	11	107
ALASKAN	98	177
ALGENIB	13	30
ALMERIA LYKES	70	
AMERICAN ACCORD	48	151
AMERICAN AQUARIUS	41	187
AMERICAN ASTRONAUT	89	231
AMERICAN CORSAIR	93	133
AMERICAN INDEPENDENCE	1	
AMERICAN LEGACY	84	130
AMERICAN LYNX	64	711
AMERICAN TRADER	129	176
ANCO STANE	147	
ANNIE JOHNSON	32	120
APCO ALASKA	69	95
APCO JUNEAU	69	159
ARCTIC TOKYO		274
ARILD MAERSK	31	46
ASIA BEAUTY	10	
ASIA HONESTY	16	
ATLANTIC BRIDGE	94	
AUSTRAL ENDURANCE	107	170
AUSTRAL LIGHTNING	57	131
AUSTRAL RAINBOW	73	187
B T ALASKA	22	277
BALD BUTTE	36	191
BARRER TAIF	17	26
BARWA	9	52
BAYARD	68	107
BIBB WHEC 31	1	
BOGASARI DUA	67	136
BOUTWELL WHEC 719	2	141
BROOKS RANGE	29	45
C.W. KITTO		151
CAPE UPRIGHT		68
CELESTINO	9	
CHARLES LYKES	58	156
CHASE WHEC 718	25	45
CHEMICAL VENTURE	34	
CHEVRON ANTWERP	20	87
CHEVRON COLORADO	66	122
CHEVRON LONDON	6	
CHEVRON NORTH AMERICA	2	79
CHEVRON SOUTH AMERICA		127
CHRISTOPHER LYKES	14	
CH APOLLO		10
COLOMBIA MARU	18	12
COMMON VENTURE	17	
CORAL ACE	7	
COURAGEOUS WHEC 672	15	28
CRYSTAL STAR	59	133
DART EUROPE	74	61
DAVID PACKARD		73
DEL MONTE	22	24
DEL VIENTO	45	79
DELTA BRASIL	36	6
DIANA	79	
DOCTOR LYKES	41	146
DRUCILLA U	20	
EAGLE	67	
EASTERN FORTUNE	15	23
EASTERN SUN	9	14
EDGAR M QUEENY	67	67
EMPIRE STATE	7	
ESSO MELBOURNE	8	
ESSO TORONTO	1	
EVER VALOR	11	76
EXPORT CHALLENGER	9	52
EXPORT PATRIOT	8	26
EXXON CHESIPO	7	14
EXXON HUNTINGTON	62	89
EXXON NORTH SLOPE	9	33
FAIRWEATHER	19	22
FIREBUSH WLB 393	25	16
FRANCIS SINCERE NO 6	31	8
GALLEON TOURMALINE	28	13
GENEVIEVE LYKES	19	
GLACIER WAGB 4	1	
GLOBAL WING	1	
GOLDEN DAISY	7	32
GOLDEN RAY	7	
GREAT REPUBLIC	1	19
GREEN ROSE	50	90
GULF RANGER	24	
GULF TRADER	29	93
HARUSAN MARU	149	101
HARTANGER	9	
HELLESPONT GLORY	84	204
HOEGH CLIPPER	17	
HOEGH MIRANDA	26	16
HOMERIC	1	
HUDSON T-AO 184	0	
INTERMARINE VENTURE	1	
ITALICA	7	47
JACKSONVILLE	94	702
JALAYAMUNA	10	
JAPAN AMBROSE	29	16
JEAN LYKES	25	
JOHN LYKES	31	29
ADM WM M CALLAGHAN	40	97
AGUADILLA	18	21
ALBATROSS IV	91	95
ALLISON LYKES	15	
ALVA MAERSK	25	64
AMERICAN ACE	67	166
AMERICAN ARCHER	77	93
AMERICAN CHALLENGER	67	
AMERICAN EXPLORER	52	
AMERICAN LANCER	113	198
AMERICAN LEGEND	73	166
AMERICAN RACER	17	
AMERICANA	22	37
ANCO TEMPLAR	116	
ANTE TOPIC	6	
ARCO ANCHORAGE	53	60
ARCO PRESTIGE	51	61
ARECIBO	66	116
ARNOLD MAERSK	40	57
ASIA BRAVERY	16	126
ASIA INDUSTRY	9	
ATLANTIC PIONEER	57	22
AUSTRAL ENSIGN	41	176
AUSTRAL ROOM	84	167
AVILA	3	6
B T SAN DIEGO	29	163
BALTIMORE TRADER	43	138
BARRER TOBA	27	26
BASSWOOD WLB388	4	
BEISHU MARU	78	26
BLESS RIVER	14	
BOWNE	78	50
BRAZOS	61	107
BUILDER	45	134
CAGUAS	1	
CAPRICORN	55	101
CHALMETTE	1	
CHARLES PIGOTT	66	221
CHASTINE MAERSK	23	45
CHERRY VALLEY	1	12
CHEVRON ARIZONA	60	148
CHEVRON COPENHAGEN	19	120
CHEVRON LOUISIANA	10	36
CHEVRON OREGON		14
CHEVRON WASHINGTON	10	57
CHUEN ON	21	32
CLARA MAERSK	13	17
COLORADO	20	72
CONALCO	58	
COPRUCOPIA	52	117
CRESSIDA	36	64
D ALBERTS	43	67
DAUNTLESS CG		16
DAVID STARR JORDAN	39	74
DEL ORO	29	37
DELAWARE GETTY	37	115
DELTA CARIBE	26	94
DISCOVERER OSS	262	256
DOLLY TURMAN	41	48
DUANE	2	
EAGLE CHARGER	12	26
EASTERN MUSE	120	
EASTERN TREASURE	12	
EDWARD RUTLEDGE	16	27
ENNA G	92	62
ESSO NASSAU	16	22
EURO-ASIA CONCORDE	21	5
EVERGREEN WAGO-295	145	77
EXPORT CHAMPION	3	27
EXXON BANGOR	69	112
EXXON FLORENCE	4	23
EXXON JAMESTOWN	31	60
EXXON PHILADELPHIA	17	75
FALSTRIA	97	148
FORT HOSKINS		11
FREDERICK LYKES	19	
GARDENIA	92	94
GENESTA	6	
GLACIER BAY	20	136
GLOMAR CHALLENGER	153	236
GOLDEN GATE	13	17
GRACE	7	
GREEN AUKLET	37	
GREEN VALLEY	9	
GULF FARMER	11	24
GULFDEER	24	
HAMILTON WHEC 715	1	98
HARKNESS TAGS 32	1	34
HECT MARU	108	49
HOEGH MALLARD		68
HOEGH OPAL	9	
HOTAKA MARU	157	44
IDAHO	9	
IRIS ISLAND	1	152
ITAPUCA	12	
JADRAN	5	
JAMES E O'BRIEN		194
JAPAN APOLLO	79	93
JELA TOPIC	17	66
JOHN TYLER	1	

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY AUGUST SEPTEMBER 1981

SHIP NAME	VIA RADIO	VIA MAIL
JOSEPH LYKES	34	
KASHU MARU	87	46
KENAI	28	76
KOFUKU MARU	27	72
KOREAN LEADER	4	12
KUROBE MARU	105	69
LAKE MENDOCINO	9	49
LASH ATLANTICO	28	49
LAVAUX	3	7
LIBRA	12	
LOMPOC	13	76
LUIGI GRIMALDI	11	
MAHARSHI KARVE	13	
MANISTEE	77	141
MANULEI	66	136
MARCONA TRADER	1	
MARIA TOPIC	33	
MARITIME JUSTICE	27	6
MATINA	75	
MAYAGUEZ	58	208
MEADOWBROOK	39	92
MEONIA	102	190
MILLER FREEMAN	104	126
MING STAR	8	
MOBIL ENGINEER	51	71
MOBILF	9	
MOBILOIL	12	56
MORMACALTAIR	31	126
MORMACLYNX	46	113
MORMACSTAR	19	68
MORMACWAVE	48	119
NAGARA	38	63
NEPTUNE AMBER	71	174
NEPTUNE RUBY	5	
NEWARK	75	142
NOPAL SEL	2	
NORTH STAR III	23	62
NURA DEL MAR	21	21
OCEAN CROWN		7
OCEANOGRAPHER	174	207
OGDEN SENEGAL	28	57
OLGA TOPIC	10	
ORE JUPITER	45	
ORIENTAL COMMANDER	46	137
ORIENTAL LEADER	13	29
ORIENTAL STATESMAN	37	144
OVERSEAS ALEUTIAN	22	28
OVERSEAS JUNEAU	24	
OVERSEAS ULLA	49	
PACDUCHESS	13	
PACIFIC ACE	17	49
PACIFIC VENTURE	129	335
PACMONARCH	23	6
PACSTAR	31	7
PAN KOREA	16	83
PENNMAR	21	40
PHILIPPINE CORREGIDOR	12	82
PIONEER NO 1	5	19
PORTLAND	100	151
PRESIDENT GARCIA	6	36
PRESIDENT JEFFERSON	73	83
PRESIDENT PIERCE	87	163
PRESIDENT TRUMAN	81	140
PRINCE O. FUNDY	1	
PROVINCIA DE EL ORO	4	32
QUINTINA	50	
RED ARROW	44	50
RESEARCHER	153	220
RICHARD	73	80
RODRIGUES CABRILHO	15	48
RUSH WHEC 723		51
SALVADOR	19	62
SAN BRUNO		68
SANKOSUN	10	10
SANTA CLARA	68	129
SANTA JUANA	6	65
SANTA MARIANA	50	161
SCANDINAVIAN HIGHWAY	99	97
SEA LAND VOYAGER	80	169
SEALAND CONSUMER	41	53
SEALAND ENDURANCE	76	146
SEALAND GALLOWAY	33	97
SEALAND MARKET	74	161
SEALAND PRODUCER	24	84
SEALIFT CARIBBEAN	6	19
SEATRAIN YORKTOWN	1	
SEKI ROKAKO	6	15
SHELDON LYKES	10	
SHUNWIND	77	152
SIMRA	71	146
SKAUGRAN	67	
SNOW WHITE	1	
SOLON TURMAN	31	15
SOUTHWARD	15	13
SPRAY STAN	9	
STAR DOVER	76	194
STOLT LLANDAFF	18	163
STREAM RUDDER	26	
SVENDRORG MAERSK	35	110
TAGAYTAY	1	
JUTHLANDIA	60	92
KATHLEEN	1	
KENNETH E MILL	30	89
KOREAN COMMANDER	3	16
KOREAN PEARL	1	
L.W. FUNKHOUSER	103	260
LAKE PALOURDE	23	139
LASH ITALTA	17	93
LESLIE LYKES	25	37
LILLOOET	71	
LONG BEACH	17	78
LYNCH T-AGOR 7		33
MALLORY LYKES	70	215
MANUAWILI	29	86
MARCHEN MAERSK	47	42
MARCONA TRANSPORTER	30	145
MARIA U	46	136
MARJORIE LYKES	17	109
MATSONIA	12	16
MAYAYAN REEFER		88
MELVILLE	15	21
MERCY	6	
MING GALAXY	42	67
MOBIL AERO		76
MOBIL LUBE	14	62
MOBILE MERIDIAN	53	100
MONMOUTH	12	15
MORMACARGO	35	66
MORMACRIGEL	4	61
MORMACSUN	43	65
MORNING GLORY	1	
NANCY LYKES	3	
NEPTUNE CRYSTAL	24	
NEW GOLDEN PHOENIX	117	138
NOBAWAY	90	86
NORDHVAL	3	
NORTHERN LIGHT	22	30
NYHORN	1	
OCEAN GOLF	10	
OCTA	33	85
OGDEN THAMES	61	
ORANGE	52	
ORE MERIDIAN	24	
ORIENTAL ESEARCHER	58	75
ORIENTAL MERCHANT	9	32
ORIENTAL TAIO		238
OVERSEAS ARCTIC		83
OVERSEAS MARILYN	54	124
OVERSEAS WASHINGTON	2	
PACDURE	34	23
PACIFIC ARROW	57	41
PACLADY	21	14
PACNOBLE	14	
PACSUN	1	
PAN PACIFIC	7	9
PERENNIAL ACE	149	493
PIONEER COMMANDER	1	
POLAR STAR WAGB-10	149	47
PRESIDENT ADAMS	14	60
PRESIDENT GRANT	69	178
PRESIDENT JOHNSON	102	225
PRESIDENT POLK	77	148
PRESIDENT TYLER	93	217
PRINCE OF TONYO	46	
PUEBLA	3	
QUIXADA	37	45
RED JACKET	46	124
RESOLUTE	32	100
RIO ABAUCAN	16	21
ROSE		56
RUTH LYKES	9	
SAM HOUSTON	17	
SAN JUAN	92	232
SANSINENA II	26	17
SANTA CRUZ	11	40
SANTA LUCIA	3	10
SANTA MERCEDES	55	136
SCANSPRUCE	1	
SEA TRANSPORT	5	
SEALAND DEFENDER	75	138
SEALAND EXPRESS	48	145
SEALAND INDEPENDENCE	41	114
SEALAND MCLEAN	35	71
SEALAND RESOURCE	32	104
SEALIFT PACIFIC	4	
SEATTLE	3	
SELANDIA	15	18
SHERMAN WHEC 720	42	39
SIENA	46	72
SINALOA	78	181
SKOUBORD	49	121
SNOWFLOWER	25	45
SONG OF NORWAY	24	
SOUTHWEST CAPE	109	
SPRUCE	13	
STAR HONGKONG	46	35
STONEWALL JACKSON	11	60
SUGAR ISLANDER	54	93
SWEETBRIER WLB 405	31	
TAI JOHN	13	19
JUTLANDIA	1	
KAUAI	94	199
KEYSTONER	60	214
KOREAN FIR	25	
KOREAN PRIDE	51	18
LAKE ARROWHEAD	23	142
LAKE SHASTA	18	92
LASH PACIFICO	34	60
LETITIA LYKES	32	
LIONS GATE BRIDGE	153	88
LOUISE	89	201
M P GRACE	1	
MALLON WLB 396	24	
MANUKAI	98	221
MARCONA CONVEYOR	4	145
MARDI GRAS	6	7
MARINE CHEMICAL TRANSP	15	100
MASON LYKES	14	44
MAUI	98	217
MAYO LYKES	36	
MENESTHEUS	49	46
METEOR T-AKR 9	27	
MING GLORY	21	43
MOBIL ARCTIC	42	177
MOBIL POWER	49	123
MOBILFUEL	14	58
MORANT	30	
MORMACDAWN	1	
MORMACSAGA	11	87
MORMACTIDE	32	58
MT MITCHELL	70	140
NAVASOTA		225
NEPTUNE DIAMOND	66	145
NEW JERSEY MARU	135	200
NOPAL BRANCO		60
NORDIC LOUISIANA	163	
NORTHWIND WAGB 282	26	
OAKLAND	16	57
OCEAN LOG	17	24
OGDEN FRASER	20	91
OGDEN WILLAMETTE		28
ORCO MINER	50	104
ORE SATURN	24	
ORIENTAL EXECUTIVE	17	34
ORIENTAL QUEEN	4	
ORUNDA	2	
OVERSEAS CHICAGO	48	76
OVERSEAS NEW YORK	22	80
PACBARON	27	29
PACEMPEROR	24	
PACIFIC ERA	91	200
PACMAJESTY	15	
PACPRINCE	34	
PAN ASIA		159
PAN WESTERN	23	
PERRYVILLE	22	
PIONEER CONTENDER	9	111
POLYNESIA	147	251
PRESIDENT CLEVELAND	62	113
PRESIDENT HOOVER	83	114
PRESIDENT MADISON	54	121
PRESIDENT TAFT	98	222
PRESIDENT VAN BUREN	76	171
PROSPERITY	23	
PUNTA MALVINAS	21	11
RADIANT STAR	3	
REGENT CEDAR	59	42
RESOLUTE WPC 620	66	
RIO BARIMA	1	
ROSE CITY	16	170
RYDJIN	1	
SAMOA	71	70
SANKOSTAR	22	
SANTA ADELA	12	98
SANTA ELENA	26	81
SANTA MAGDALENA	8	
SARGODHA	46	118
SCILLA	51	
SEALAND ADVENTURER	32	83
SEALAND DEVELOPER	77	145
SEALAND FINANCE	39	107
SEALAND INNOVATOR	63	95
SEALAND PATRIOT	49	161
SEALAND VENTURE	17	128
SEASPEED ARABIA	1	
SEAWAY	1	
SEPTA	5	
SHING ON	3	25
SILVER PHOENIX	37	16
SINCERE NO 3	26	
SKYWARD	14	7
SOCONY VACUUM	30	83
SOUTH LIGHT	12	
SPAIN MARU	32	17
STADT BREMEN	23	
STARWARD	73	17
STORIS WAGB 38	2	
SURVEYOR	1	
SYLVO	2	
TAINO VENTURE	12	
KARIMITA	4	73
KEIYO	19	80
KNORR	112	256
KOREAN JUPITER	14	19
KRPEN	84	
LAKE BERRYESSA	37	59
LAKE TAHOE	13	
LAUREL WLB2901	46	48
LEXA MAERSK	117	
LLOYD CUIABA	10	
LOUISE LYKES	35	
MAGDALENA	83	
MANICA	42	121
MANULANI	105	200
MARCONA EXPORTER	74	259
MARGARET LYKES	38	69
MARITIME HARMONY	37	
MATHIESON	30	138
MAUMEE	2	
MAYON	8	
MENINA ALICE	20	
MIDGETT WHEC 726	108	92
MING MOON	52	42
MOBIL COMET	1	
MOBIL VENTURE	1	
MOBILGAS	57	118
MORGENTHAU WHEC 722	65	164
MORMACBRACO	29	81
MORMACSEA	17	65
MORMACVEGA	50	122
MUNRO WHEC 724	141	113
NECHES	45	
NEPTUNE JADE	22	
NEW YORK MARU	87	44
NOPAL LANE	11	
NORSE PILOT	85	50
NORWAY	115	
OCEAN BRAVE	15	23
OCEANIC	157	231
OGDEN JORDAN	89	236
OLEANDER	138	123
ORCO TRADER	53	155
ORIENTAL CHAMPION	6	
ORIENTAL EXPORTER	1	
ORIENTAL SOVEREIGN	41	47
OTTO N. MILLER	14	203
OVERSEAS HARRIET	33	113
OVERSEAS OHIO	25	
PACBARONESS	22	13
PACGLORY	22	
PACIFIC SAGA	64	107
PACMERCHANT	19	15
PACPRINCESS	14	
PAN DYNASTY	16	
PARALLA	23	
PHILADELPHIA	72	133
PIONEER MOON	68	163
PONCE	1	
PRESIDENT FILLMORE	68	167
PRESIDENT JACKSON	28	32
PRESIDENT MC KINLEY	73	162
PRESIDENT TAYLOR	47	103
PRESIDENT WILSON	41	96
PROSPERITY QUEEN	21	
QUEENS WAY BRIDGE	156	89
RAINIER	29	33
RELIANCE WHEC 615	1	28
RHEINFELS	9	
ROBERT E LEE	14	60
ROYAL VIKING SKY	11	
SACRAMENTO	8	84
SAMUEL S	10	
SANKOSTEEL	17	90
SANTA BARBARA	26	26
SANTA FE	80	92
SANTA MARIA	31	44
SATSUMA	18	36
SEA FAN	8	
SEALAND COMMERCE	93	142
SEALAND ECONOMY	75	127
SEALAND FREEDOM	69	97
SEALAND LEADER	37	167
SEALAND PIONEER	18	97
SEALIFT ARABIAN SEA	2	84
SEATRAIN TRENTON	41	
SEDGE WLB 402	22	
SEVEN OCEAN	12	
SHIRLEY LYKES	10	
SILVERLIME		92
SINCERE NO 5	25	
SNOW CRYSTAL	12	112
SONTO INTREPID	64	214
SOUTHERN CROSS	1	149
SPERO	18	
STAR DIEPPE	39	
STELLA LYKES	22	6
STREAM HAWSER	20	13
SUSQUEHANNA	18	48
T F L LIBERTY	21	38
TAIWAN PHOENIX	8	

TOTAL WEATHER REPORTS RECEIVED FROM US COOPERATIVE OBSERVING SHIPS JULY AUGUST SEPTEMBER 1981

SHIP NAME	VIA RADIO	VIA MAIL
TALUGA T-AO-62	86	
TAURUS	3	112
TEXACO GHENT	76	
TEXAS	16	16
TFL FREEDOM	17	119
THOMPSON LYKES	26	
TOKYO RAINBOW	29	46
TOSCA	22	43
TOYOTA MARU NO 17	46	50
TROPICANA	2	
ULTRASEA	12	16
UNIVERSE	22	
VALLEY FORGE	32	41
VAN HAWK	40	79
VIENNA WOODS	31	24
WASHINGTON TRADER	78	190
WESTWARD VENTURE	116	173
WILMINGTON GETTY	46	82
WORLD CANDOUR	42	78
YAMASHIN MARU	154	153
YOUNG SEAGULL	22	
ZOELLA LYKES	17	
A8TH	16	59
BLHN	12	15
C5DM	21	18
D7GS	16	107
DZWU	2	4
D5IG	63	123
D5KG		98
D7DB		88
D9DY	1	18
ELAV	21	16
ELAW3	8	162
ELFY		160
ELRT	64	92
H3FN	33	43
H3SY		62
H8TC	23	26
H9IR	15	11
H9QH	4	21
H9ZK	32	46
JFMT	22	16
JFNO	47	67
KCVP		55
KHRP	63	175
KSFJ	46	161
LPWR	31	53
NHMX		215
OXPS	25	68
S6G7		15
S6GY	36	8
WDZP	23	85
WNCY		37
WYQ5902		31
3FED	2	3
5MAH		18
5MZW	7	48
7LYP	23	27
9VXU		53

SHIP NAME	VIA RADIO	VIA MAIL
TAMAROA WREC-166		28
TENNESSEE	38	36
TEXACO IOWA	1	
TEXAS CLIPPER	30	
THOMAS G THOMPSON	127	196
THOMPSON PASS	6	34
TOLUCA	5	8
TOWNSEND CROMWELL	160	182
TOYOTA MO 24	32	
TSU	15	
UNION PROGRESS	3	18
USNS BARTLETT	8	13
VALOR	14	75
VANGUARD	6	107
VIOLET	44	
WASHINGTON WOOD	18	157
WESTWIND WAGB 281	58	83
WINTER MOON	4	70
WORLD CREST	1	
YOCONA WREC 168	89	54
YUKON T-AO 152	29	48
ATPG	6	18
A8W8	52	116
BMDF	9	20
CZDG		100
DZWR	46	115
DZZR	29	103
D5VK	40	58
D5XP	23	40
D8PU	2	12
EMQK	1	30
ELAV6	8	28
ELAY5		28
ELIJ	6	4
ELYM	47	164
HMSM		28
H8DE	32	24
H8VU	20	40
H9IU	4	6
H9TM		108
JCUF	5	27
JMJL	4	16
JRBG	65	38
KFGT		16
KIGP	28	57
KSFK	7	23
NDCV	15	32
NNBN		665
PJAG	22	16
SGLN	59	149
S6G7	64	138
WFCS		25
WYQ5902		50
WZL8196		8
5B2387	14	89
5MOJ	20	34
6ZIG	56	95
8KCC	2	2

SHIP NAME	VIA RADIO	VIA MAIL
TAMPA	43	
TERRIER	10	21
TEXACO MASSACHUSETTS	7	
TEXAS TRADER	77	113
THOMAS NELSON	13	23
TILLIE LYKES	55	158
TONCI TOPIC	4	37
TOYOTA MARU 10	158	83
TRINITY	9	21
TUBUL	21	
UNIQUE FORTUNE	4	
USNS WACCAMAW		52
VAN CONQUEROR	84	193
VELMA LYKES	25	88
WALCHAND	4	
WESER EXPRESS	102	181
WHITING	10	50
WINTER WATER	64	128
WORLD HERCULES	3	51
YOUNG AMERICA	24	31
ZIM HONGKONG	22	
ATUJ	49	63
A8ZW	29	198
CBAC	12	19
DARL	25	52
DZWZ		70
D5BU	28	37
D5WE	13	91
D5ZP	44	56
D8ZP	11	17
ELAJ6		88
ELAY9		188
ELCJ	8	22
ELNC	9	33
H8DQ	3	38
H8A4	7	9
H8GQ	7	46
H9AS	6	43
H9RI	21	52
H9VM	34	91
JDUS	120	132
JMZR	19	38
JREG	17	70
KGJF	48	101
KPHL	20	32
KSL8	24	99
NDLY		9
NOSI		3
PKZC	15	14
S6CF	23	48
VRFF	90	166
WGJF	106	214
WQS906		8
ZCKV	90	155
5LSD	9	19
5MUE	10	171
6ZRT	29	138
8KRF	67	41

SHIP NAME	VIA RADIO	VIA MAIL
TANEY WMEC 37	12	
TEXACO GEORGIA	8	
TEXACO NEW YORK		35
TFL DEMOCRACY	10	121
THOMAS WASHINGTON	1	2
TOHBEI MARU	45	29
TONSINA	38	164
TOYOTA MARU 12	125	193
TRIUMPH	35	
TYSON LYKES	57	167
UNITED SPIRIT	49	251
VALIANT		39
VAN FORT	26	87
VERRAZANO BRIDGE	45	42
WALTER RICE	63	192
WESTERN SUN	11	102
WILLIAM E MUSSMAN	18	67
WOODRUSH WLR407	5	
WORTH	45	
YOUNG SCOPE	43	85
ZIM MONTREAL	47	
ABGS		36
BREC	8	20
CBHO	10	14
DZDI	1	54
DZSX	5	104
D5CN	7	56
D5WV	2	208
D7AM	18	33
D9DR		67
ELAP3	75	178
ELAW	19	33
ELFF		1
ELPJ	12	16
H8FW	23	93
H9VR	28	16
H8LR	20	97
H9CH	34	178
H9NO	18	72
H9XW	27	39
JFGM		33
JOXW		17
KBIK		45
KHLO		5
KRDB	10	29
LICX	3	11
NMHK		5
NYBR	1	19
PPII	8	8
S6ED		8
VRGO	62	80
WMCL		16
WYS7261		59
3EBP	20	24
5LUB	61	297
5MYK	66	131
7KGS	30	49
9VUG	18	118

SUMMARY: GRAND TOTAL VIA RADIO 34693 GRAND TOTAL VIA MAIL 65301

U.S. Ocean Buoy Climatological Data

July, August and September 1981

JULY — DATA SUMMARY — 41002
AVERAGE LATITUDE 32.3N — AVERAGE LONGITUDE 075.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	22.7	(25 09)	26.8	30.0	(13 21)	246	31
SEA TEMP (DEG C)	26.2	(01 09)	27.4	29.5	(13 21)	246	31
AIR-SEA TEMP (DEG C)	-04.1	(23 12)	-00.6	00.8	(24 12)	246	31
PRESSURE (MBAR)	1010.5	(15 09)	1018.7	1026.0	(26 15)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 244

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	3.3	.4				4.1	6.7
NE	1.2	2.9	.4				4.5	6.2
E		2.5	2.9				5.3	10.8
SE		4.5	6.1				10.7	11.1
S	1.2	6.1	13.5	.4			21.3	12.1
SW	.8	14.8	21.3	.4			37.3	11.8
W	2.0	4.5	3.7				10.7	7.8
NW	.4	2.5	1.2				4.1	8.8
CALM	2.5						2.5	.0
TOTAL	8.6	41.8	49.6	.8			100.0	10.4

MAX WIND — SPEED: 22 KNOTS; DIRECTION: 190 DEG; DAY: 22; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	18.9	71.1	6.9						1.1M	2.5M (23 09)

JULY — DATA SUMMARY — 41003
AVERAGE LATITUDE 30.3N — AVERAGE LONGITUDE 080.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	25.2	(03 06)	27.4	30.6	(12 21)	247	31
SEA TEMP (DEG C)	24.5	(03 12)	27.2	29.9	(27 21)	247	31
AIR-SEA TEMP (DEG C)	-01.6	(31 12)	00.2	02.2	(17 21)	247	31
PRESSURE (MBAR)	1011.6	(18 00)	1017.5	1023.7	(27 18)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	2.4					2.8	6.4
NE	.8	1.6					2.4	4.2
E	2.4	.8					3.2	2.7
SE	4.0	9.7	1.6				15.4	6.3
S	1.6	13.1	8.3				23.1	8.8
SW	2.4	19.8	8.1				30.4	8.5
W	2.0	12.6	1.6				16.2	6.9
NW	1.2	4.0					5.3	5.0
CALM	1.2						1.2	.0
TOTAL	16.2	63.2	20.6				100.0	7.3

MAX WIND — SPEED: 17 KNOTS; DIRECTION: 210 DEG; DAY: 23; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 103

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	40.8	59.2							.8M	1.5M (24 12)

JULY — DATA SUMMARY — 41005
AVERAGE LATITUDE 31.7N — AVERAGE LONGITUDE 079.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	21.7	(01 06)	27.7	30.7	(16 21)	248	31
SEA TEMP (DEG C)	25.9	(05 09)	28.1	29.9	(28 21)	248	31
AIR-SEA TEMP (DEG C)	-05.1	(01 06)	-00.5	01.8	(15 15)	248	31
PRESSURE (MBAR)	1009.6	(15 09)	1016.7	1023.5	(27 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	3.8	.8				4.8	8.1
NE	.4	1.6	.4				2.4	7.0
E	2.4	4.9	.8				8.1	6.2
SE	.8	2.8	2.8	.8			6.5	10.9
S	1.2	12.1	9.3				22.7	9.6
SW	.8	16.2	19.0	.4			36.4	11.2
W	1.6	7.3	4.9				13.8	8.6
NW	1.2	1.2					2.4	3.8
CALM	3.6						3.6	.0
TOTAL	12.6	49.8	37.2	1.2			100.0	9.2

MAX WIND — SPEED: 27 KNOTS; DIRECTION: 150 DEG; DAY: 03; HOUR: 12

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	40.3	56.9	2.0	.8					.9M	3.0M (07 12)

JULY — DATA SUMMARY — 42001
AVERAGE LATITUDE 25.9N — AVERAGE LONGITUDE 089.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	25.1	(03 21)	29.1	33.4	(30 18)	248	31
SEA TEMP (DEG C)	27.7	(02 12)	28.8	31.8	(17 21)	248	31
AIR-SEA TEMP (DEG C)	-03.6	(22 21)	00.2	02.9	(30 18)	248	31
PRESSURE (MBAR)	1013.4	(02 09)	1016.9	1020.6	(09 03)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.0	4.0	.4				6.5	5.9
NE	7.3	9.7	2.0				19.0	4.9
E	3.6	16.9	14.1				34.7	9.3
SE	1.2	10.1	10.9	.8			23.0	10.8
S		5.6	4.0				9.7	10.2
SW		.4					.4	5.0
W		1.6					1.6	7.8
NW		.8					.8	6.8
CALM	4.4						4.4	.0
TOTAL	18.5	49.2	31.5	.8			100.0	8.2

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 130 DEG; DAY: 25; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	64.9	33.1	2.0						.6M	2.0M (25 15)

AUGUST — DATA SUMMARY — 41002
AVERAGE LATITUDE 32.3N — AVERAGE LONGITUDE 075.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	22.4	(30 09)	26.9	29.1	(07 15)	246	31
SEA TEMP (DEG C)	27.2	(02 12)	28.5	29.9	(10 21)	246	31
AIR-SEA TEMP (DEG C)	-05.9	(30 09)	-01.6	00.4	(04 12)	246	31
PRESSURE (MBAR)	1007.9	(20 09)	1017.9	1025.3	(10 15)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	2.0	1.2				4.5	7.8
NE	2.4	7.7	4.1	.8			15.0	9.4
E	2.8	4.9	5.3				13.0	8.9
SE	1.2	6.5	4.1				11.8	8.7
S	1.6	5.3	7.7	2.4			17.1	13.2
SW	1.2	5.7	14.2	3.3			24.4	13.9
W	.8	4.1	4.1	.4			9.3	10.8
NW	.8	1.2	1.2				3.3	7.3
CALM	1.6						1.6	.0
TOTAL	13.8	37.4	41.9	6.9			100.0	10.8

MAX WIND — SPEED: 28 KNOTS; DIRECTION: 240 DEG; DAY: 20; HOUR: 12

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	2.4	79.3	13.0	4.9	.4				1.4M	4.0M (20 06)

AUGUST — DATA SUMMARY — 41003
AVERAGE LATITUDE 30.3N — AVERAGE LONGITUDE 080.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.5	(19 15)	26.9	29.2	(04 21)	246	31
SEA TEMP (DEG C)	25.9	(26 09)	27.7	29.6	(04 21)	246	31
AIR-SEA TEMP (DEG C)	-04.5	(28 03)	-00.8	00.8	(26 18)	246	31
PRESSURE (MBAR)	1003.5	(19 09)	1016.6	1023.2	(10 15)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	8.1	3.7				13.0	9.1
NE	1.2	7.3	2.4				11.0	7.2
E	1.6	9.8	2.0				13.4	7.2
SE	2.0	8.9	2.8				13.8	7.7
S	1.6	13.0	6.9	.4			22.0	8.2
SW	2.8	4.9	4.1				11.8	8.1
W	1.6	2.4	2.4	.4			6.9	9.1
NW	.8	4.1	2.8				7.7	8.7
CALM	1.2						1.2	.0
TOTAL	13.4	58.5	27.2	.8			100.0	8.2

MAX WIND — SPEED: 25 KNOTS; DIRECTION: 250 DEG; DAY: 19; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 76

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	61.3	38.7							.7M	1.5M (04 06)

AUGUST — DATA SUMMARY — 41006
AVERAGE LATITUDE [illegible] — AVERAGE LONGITUDE 079.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	22.6	(29 12)	26.7	29.0	(17 18)	244	31
SEA TEMP (DEG C)	24.6	(23 06)	27.8	30.2	(17 21)	244	31
AIR-SEA TEMP (DEG C)	-04.8	(21 00)	-01.1	01.2	(27 15)	244	31
PRESSURE (MBAR)	1002.7	(19 15)	1016.2	1022.8	(10 15)	244	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 244

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	4.9	5.7	.8			12.3	10.4
NE	.8	8.2	9.0	.8			18.9	11.7
E	1.2	4.5	4.1	.4			10.2	9.6
SE		3.3	1.6	.4			5.3	9.5
S	1.2	12.7	8.2	.8			23.0	10.4
SW	.4	7.4	7.8	.8			16.4	11.5
W	1.2	2.9	5.3	.8			10.2	11.3
NW		.8	1.6				2.5	13.0
CALM	1.6						1.6	.0
TOTAL	7.0	40.7	43.4	4.5			100.0	10.7

MAX WIND — SPEED: 28 KNOTS; DIRECTION: 180 DEG; DAY: 19; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 172

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	29.7	58.1	8.7	3.5					1.1M	3.5M (19 21)

AUGUST — DATA SUMMARY — 42001
AVERAGE LATITUDE 25.9N — AVERAGE LONGITUDE 089.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	26.3	(21 21)	29.5	33.1	(02 21)	247	31
SEA TEMP (DEG C)	28.3	(29 15)	29.5	32.8	(02 21)	248	31
AIR-SEA TEMP (DEG C)	-03.2	(21 21)	00.0	02.0	(29 06)	247	31
PRESSURE (MBAR)	1010.3	(17 21)	1015.1	1020.9	(01 15)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.4	2.0	.4				4.8	9.2
NE	6.9	12.1	3.2				22.2	6.8
E	4.0	18.1	11.3				33.5	8.6
SE	.8	7.3	8.5				16.5	10.8
S		5.6	4.8				10.5	10.2
SW		2.0	.4				2.4	8.2
W		2.0					2.0	6.8
NW	.4	2.4	.4				3.2	6.8
CALM	4.8						4.8	.0
TOTAL	19.4	51.6	29.0				100.0	7.8

MAX WIND — SPEED: 19 KNOTS; DIRECTION: 120 DEG; DAY: 26; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	69.0	31.0							.7M	1.5M (30 18)

SEPTEMBER — DATA SUMMARY — 41002
AVERAGE LATITUDE 32.3N — AVERAGE LONGITUDE 075.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	21.4	(25 09)	25.5	28.6	(05 21)	236	30
SEA TEMP (DEG C)	27.1	(30 12)	28.0	29.5	(14 18)	236	30
AIR-SEA TEMP (DEG C)	-06.0	(25 09)	-02.5	00.0	(16 21)	236	30
PRESSURE (MBAR)	1009.7	(09 09)	1017.5	1025.2	(25 15)	236	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 135

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.2	4.4	8.9				15.6	9.7
NE	1.5	9.6	13.3				24.4	10.7
E	3.7	9.6	.7				14.1	5.0
SE	3.7	3.7	.7				8.1	5.1
S	2.2	7.7	5.9	2.2			18.1	12.8
SW	.7	4.4	8.1	.7			14.1	13.4
W	.7	3.0	.7				4.4	7.3
NW								
CALM	5.2						5.2	.0
TOTAL	20.0	38.5	38.5	3.0			100.0	9.3

MAX WIND — SPEED: 25 KNOTS; DIRECTION: 190 DEG; DAY: 18; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 236

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	11.9	52.5	27.1	6.8	1.7				1.6M	4.0M (04 18)

SEPTEMBER — DATA SUMMARY — 41003
AVERAGE LATITUDE 30.3N — AVERAGE LONGITUDE 080.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	19.9	(19 15)	26.3	28.8	(12 18)	238	30
SEA TEMP (DEG C)	26.6	(01 03)	28.0	29.3	(12 21)	238	30
AIR-SEA TEMP (DEG C)	-08.4	(19 15)	-01.7	00.5	(16 03)	238	30
PRESSURE (MBAR)	1010.3	(09 09)	1016.9	1024.2	(25 15)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.1	13.4	2.1				17.6	7.0
NE	2.1	17.2	6.3				25.6	8.0
E	1.3	13.4	4.6				19.3	8.3
SE	1.7	5.0	.8				7.6	6.1
S	1.3	3.8	1.7				6.7	7.8
SW	1.7	1.3	2.5				5.5	8.6
W	3.4	4.6	1.7				9.7	6.8
NW	.8	2.5	4.2				7.6	9.7
CALM	.4						.4	.0
TOTAL	14.7	61.3	23.9				100.0	7.7

MAX WIND — SPEED: 21 KNOTS; DIRECTION: 270 DEG; DAY: 16; HOUR: 18

SEPTEMBER — DATA SUMMARY — 41005
AVERAGE LATITUDE 31.7N — AVERAGE LONGITUDE 079.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	20.6	(19 12)	26.0	28.5	(16 03)	239	30
SEA TEMP (DEG C)	26.9	(06 09)	28.5	29.8	(07 21)	239	30
AIR-SEA TEMP (DEG C)	-08.8	(19 12)	-02.5	00.8	(06 09)	239	30
PRESSURE (MBAR)	1008.5	(09 09)	1016.5	1024.4	(25 15)	239	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.7	9.7	.4				11.8	6.3
NE	1.3	21.0	8.4				30.7	8.8
E	2.1	10.9	.4				13.4	6.2
SE	1.3	4.2					5.5	5.0
S	2.1	4.2	1.3				7.6	7.0
SW	1.3	4.6	3.8				9.7	8.7
W	2.9	5.0	2.5				10.5	6.9
NW	2.5	5.5	2.1				10.1	7.1
CALM	.8						.8	.0
TOTAL	16.0	65.1	18.9				100.0	7.3

MAX WIND — SPEED: 20 KNOTS; DIRECTION: 240 DEG; DAY: 16; HOUR: 18

SEPTEMBER — DATA SUMMARY — 42001
AVERAGE LATITUDE 25.9N — AVERAGE LONGITUDE 089.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	28.4	(08 00)	29.6	32.7	(07 18)	121	17
SEA TEMP (DEG C)	27.6	(30 12)	29.2	31.3	(07 21)	121	17
AIR-SEA TEMP (DEG C)	-01.2	(06 21)	00.4	03.1	(07 18)	120	17
PRESSURE (MBAR)	1011.1	(02 00)	1014.5	1018.0	(12 15)	122	17

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 121

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	3.3	5.8					9.1	6.5
NE	9.1	11.6	4.1				24.8	5.8
E	5.0	21.6	11.6	.8			43.0	9.1
SE	.8	8.3	1.7				10.7	8.2
S		1.7	1.7				3.3	9.0
SW								
W		1.7					1.7	5.5
NW		3.3	.8				4.1	7.0
CALM	3.3						3.3	.0
TOTAL	21.5	57.9	19.8	.8			100.0	7.3

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 300 DEG; DAY: 30; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 116

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	91.4	8.6							.6M	1.5M (30 18)

JULY — D A T A   S U M M A R Y — 42002
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 093.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	27.0	(31 21)	28.6	31.0	(11 21)	247	31
SEA TEMP (DEG C)	28.6	(02 12)	29.6	31.6	(21 21)	248	31
AIR-SEA TEMP (DEG C)	-06.6	(31 21)	-01.0	00.2	(11 21)	247	31
PRESSURE (MBAR)	1012.7	(07 00)	1017.0	1021.5	(31 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	3.6					4.8	5.1
NE	.4	5.2					5.6	7.1
E	4.0	23.8	5.2				33.1	7.5
SE	2.0	19.8	16.5	.4			38.7	9.9
S	1.6	7.7	4.4	.4			14.1	9.3
SW	.4	.8	.4				1.6	7.5
W	.4	1.2					1.6	5.0
NW								
CALM	.4						.4	.0
TOTAL	10.5	62.1	26.6	.8			100.0	8.5

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 150 DEG; DAY: 26; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	66.9	31.5	1.6						.7M	2.0M (26 09)

JULY — D A T A   S U M M A R Y — 42003
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 086.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.9	(22 12)	28.3	30.1	(20 00)	248	31
SEA TEMP (DEG C)	27.3	(22 15)	29.3	31.5	(31 21)	249	31
AIR-SEA TEMP (DEG C)	-04.8	(21 21)	-01.0	00.3	(26 12)	248	31
PRESSURE (MBAR)	1013.2	(28 09)	1017.9	1021.0	(27 15)	249	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 249

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.6	5.6	.4				7.7	5.9
NE	1.2	4.4	1.2				6.9	6.1
E	1.2	22.6	7.3				31.0	8.2
SE	1.2	12.9	2.4				16.5	8.0
S	4.0	8.1					12.1	6.7
SW	3.2	2.8					6.0	3.7
W	4.0	8.9					12.9	4.8
NW	3.2	1.6		.4			5.2	5.3
CALM	1.6						1.6	.0
TOTAL	21.4	66.9	11.3	.4			100.0	6.5

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 170 DEG; DAY: 21; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	76.2	21.8	2.0						.6M	2.0M (25 18)

JULY — D A T A   S U M M A R Y — 42007
AVERAGE LATITUDE 30.1N — AVERAGE LONGITUDE 088.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.2	(02 12)	29.1	32.7	(19 00)	240	31
SEA TEMP (DEG C)	27.7	(03 15)	30.3	33.3	(31 21)	240	31
AIR-SEA TEMP (DEG C)	-05.7	(10 03)	-01.2	01.1	(09 21)	240	31
PRESSURE (MBAR)	1012.5	(16 00)	1017.0	1023.2	(08 15)	240	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 240

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	3.8	1.7				5.8	8.6
NE	.8	1.7	1.7				4.2	9.2
E		2.5	2.9	.4	.4		6.3	12.4
SE	.4	10.4	5.4				16.3	9.2
S	1.7	10.4	5.4				17.5	8.6
SW		7.1	12.1				19.2	11.9
W	.8	7.5	11.7				20.0	10.8
NW	.8	3.7	4.6				9.8	10.7
CALM	2.1						2.1	.0
TOTAL	7.1	45.7	45.4	.8	.4		100.0	10.0

MAX WIND — SPEED: 34 KNOTS; DIRECTION: 100 DEG; DAY: 10; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 219

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	99.1	.9							.3M	1.0M (06 03)

JULY — D A T A   S U M M A R Y — 42008
AVERAGE LATITUDE 28.7N — AVERAGE LONGITUDE 095.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.0	(06 03)	28.7	30.5	(24 21)	237	31
SEA TEMP (DEG C)	28.2	(08 18)	29.9	31.2	(15 00)	237	31
AIR-SEA TEMP (DEG C)	-05.4	(06 00)	-01.1	00.5	(08 06)	237	31
PRESSURE (MBAR)	1010.9	(06 03)	1015.8	1021.0	(08 18)	237	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 234

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.3	.8				2.1	10.6
NE	.4	2.1	1.3				3.8	9.2
E		2.5	4.7				7.2	11.6
SE	.4	4.9	19.8	.4			25.0	11.6
S		16.6	28.0	2.1			46.7	12.3
SW	.4	6.4	3.0				9.7	9.0
W		1.7					1.7	7.0
NW	.4	1.3	.4				2.1	6.6
CALM								
TOTAL	2.1	47.4	53.0	7.5			100.0	11.4

MAX WIND — SPEED: 34 KNOTS; DIRECTION: 170 DEG; DAY: 07; HOUR: 12

AUGUST — D A T A   S U M M A R Y — 42002
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 093.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.5	(25 15)	29.0	31.4	(02 21)	248	31
SEA TEMP (DEG C)	29.5	(01 06)	30.5	32.7	(01 21)	248	31
AIR-SEA TEMP (DEG C)	-05.5	(25 15)	-01.5	00.3	(02 15)	248	31
PRESSURE (MBAR)	1010.4	(27 09)	1015.3	1021.9	(01 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	3.6					4.4	5.5
NE	3.6	6.9					10.5	5.0
E	4.0	18.1	5.2				27.4	7.6
SE	4.0	19.4	9.3				32.7	8.1
S	3.4	7.3	2.8				13.7	6.9
SW	1.2	1.6	.4				3.2	4.9
W	2.0	.8					2.8	3.0
NW	.8	.8					1.6	4.0
CALM	3.6						3.6	.0
TOTAL	23.4	58.5	17.7				100.0	6.8

MAX WIND — SPEED: 18 KNOTS; DIRECTION: 160 DEG; DAY: 31; HOUR: 12

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	77.4	22.6							.5M	1.5M (31 21)

AUGUST — D A T A   S U M M A R Y — 42003
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 086.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.1	(11 06)	28.4	30.6	(01 21)	247	31
SEA TEMP (DEG C)	28.6	(20 03)	29.6	31.5	(02 00)	247	31
AIR-SEA TEMP (DEG C)	-06.6	(11 06)	-01.2	00.5	(04 15)	247	31
PRESSURE (MBAR)	1009.0	(17 00)	1015.1	1020.5	(01 15)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	4.5	3.2				8.5	8.9
NE	1.6	8.5	4.5				14.6	8.1
E	3.6	18.6	4.0	.4			26.7	7.5
SE	.8	11.3	4.9				17.0	7.8
S	2.8	8.9	2.4				14.2	6.9
SW	1.6	2.4	.4				4.5	5.7
W	.4	3.2	3.6				7.3	9.5
NW		2.0	.4				2.4	8.8
CALM	4.9						4.9	.0
TOTAL	16.6	59.5	23.5	.4			100.0	7.4

MAX WIND — SPEED: 29 KNOTS; DIRECTION: 110 DEG; DAY: 11; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	53.4	45.7	.8						.8M	2.0M (28 09)

AUGUST — D A T A   S U M M A R Y — 42007
AVERAGE LATITUDE 30.1N — AVERAGE LONGITUDE 088.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	25.1	(21 12)	28.9	31.8	(19 21)	181	24
SEA TEMP (DEG C)	29.7	(23 15)	31.1	32.7	(19 00)	181	24
AIR-SEA TEMP (DEG C)	-05.7	(21 12)	-02.2	00.8	(13 15)	181	24
PRESSURE (MBAR)	1008.9	(18 00)	1015.6	1020.9	(10 18)	181	24

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 180

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.6	6.7	1.1				8.3	7.7
NE	.6	5.0	1.7				7.2	8.5
E	.6	5.6	3.3				9.4	9.0
SE	1.7	10.6	1.1				13.3	7.3
S	1.1	15.6	3.9				20.6	7.7
SW	.6	11.1	2.8				14.4	8.3
W	2.8	6.1	6.1				15.0	8.4
NW	.6	3.3	1.7				5.6	8.3
CALM	6.1						6.1	.0
TOTAL	14.4	63.9	21.7				100.0	7.6

MAX WIND — SPEED: 19 KNOTS; DIRECTION: 220 DEG; DAY: 06; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 176

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	98.3	1.7							.2M	1.0M (22 15)

AUGUST — D A T A   S U M M A R Y — 42008
AVERAGE LATITUDE 28.7N — AVERAGE LONGITUDE 095.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.1	(19 21)	29.0	30.5	(15 18)	248	31
SEA TEMP (DEG C)	29.4	(31 21)	30.5	31.7	(18 21)	248	31
AIR-SEA TEMP (DEG C)	-07.1	(19 21)	-01.5	00.1	(31 21)	248	31
PRESSURE (MBAR)	1007.4	(31 21)	1014.5	1020.4	(01 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.6	4.4	.4			6.5	12.2
NE		3.6	4.9	.8			9.3	12.3
E		4.0	13.3	.4			19.4	12.0
SE	.4	4.9	11.7	.4			21.4	11.0
S	.4	11.7	14.1	2.0			28.2	11.8
SW		6.4	3.6				10.1	9.5
W		.4	1.2				1.6	11.3
NW		2.4	.8				3.2	9.0
CALM								
TOTAL	.8	41.1	54.0	4.0			100.0	11.4

MAX WIND — SPEED: 30 KNOTS; DIRECTION: 180 DEG; DAY: 31; HOUR: 18

SEPTEMBER — D A T A   S U M M A R Y — 42002
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 093.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.1	(19 09)	28.8	30.9	(13 18)	238	30
SEA TEMP (DEG C)	28.7	(30 15)	29.7	32.0	(12 21)	238	30
AIR-SEA TEMP (DEG C)	-05.2	(19 09)	-01.7	-00.1	(13 18)	238	30
PRESSURE (MBAR)	1010.0	(02 00)	1016.1	1023.1	(19 03)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.9	3.8	5.0	.8			12.6	11.1
NE	.8	6.3	6.3	.4			13.9	10.1
E	2.1	11.3	22.7				36.1	11.2
SE	1.7	5.5	4.6				11.8	9.3
S	.8	8.0	5.0				13.9	8.9
SW		2.5					2.5	6.7
W	.4	1.3	.4				2.1	6.6
NW	.4	2.9					3.4	5.4
CALM	3.8						3.8	.0
TOTAL	13.0	41.6	44.1	1.3			100.0	9.7

MAX WIND — SPEED: 24 KNOTS; DIRECTION: 030 DEG; DAY: 17; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 237

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	49.4	44.3	5.5	.8					.8M	3.0M (19 00)

SEPTEMBER — D A T A   S U M M A R Y — 42003
AVERAGE LATITUDE 26.0N — AVERAGE LONGITUDE 086.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.2	(25 15)	27.9	29.8	(08 21)	238	30
SEA TEMP (DEG C)	27.8	(30 09)	29.5	31.2	(08 21)	238	30
AIR-SEA TEMP (DEG C)	-05.0	(18 12)	-01.6	00.0	(30 15)	238	30
PRESSURE (MBAR)	1011.5	(02 00)	1015.4	1020.7	(25 15)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.9	5.9	2.9	.4			12.2	8.8
NE	2.1	17.2	14.3	.4			34.0	9.8
E	2.5	14.7	9.7				26.9	8.7
SE	1.7	2.9	.4				5.0	7.0
S	.8	3.4					4.2	5.5
SW	.4	1.7					2.1	7.0
W	.8	3.4					4.2	4.9
NW	2.5	6.3					8.8	4.6
CALM	2.5						2.5	.0
TOTAL	16.0	55.5	27.3	.8			100.0	8.1

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 020 DEG; DAY: 18; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 233

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	70.0	25.3	4.7						.7M	2.5M (19 00)

SEPTEMBER — D A T A   S U M M A R Y — 42007
AVERAGE LATITUDE 30.1N — AVERAGE LONGITUDE 088.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	17.8	(18 12)	25.7	29.2	(12 21)	192	28
SEA TEMP (DEG C)	24.0	(28 09)	27.8	30.2	(12 21)	192	28
AIR-SEA TEMP (DEG C)	-10.2	(18 18)	-02.2	00.6	(24 21)	192	28
PRESSURE (MBAR)	1012.8	(15 21)	1016.5	1025.3	(10 15)	192	28

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 152

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.3	9.6	9.2	.7			19.8	11.1
NE		9.9	6.6	1.3			17.8	13.1
E	.7	7.2	6.6				14.5	9.9
SE	5.9	4.6	5.9				16.4	7.5
S	5.3	6.6	2.0				13.8	5.1
SW	2.6	3.9	2.0				8.6	7.2
W	2.0	3.3	.7				5.9	5.1
NW	.7	3.9	1.3				5.9	7.7
CALM	5.3						5.3	.0
TOTAL	23.7	40.1	34.2	2.0			100.0	8.5

MAX WIND — SPEED: 25 KNOTS; DIRECTION: 030 DEG; DAY: 18; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 142

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	88.0	12.0							.3M	1.0M (20 00)

SEPTEMBER — D A T A   S U M M A R Y — 42008
AVERAGE LATITUDE 28.7N — AVERAGE LONGITUDE 095.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	19.2	(18 09)	27.0	29.8	(09 00)	229	30
SEA TEMP (DEG C)	26.1	(21 12)	28.5	30.6	(04 21)	229	30
AIR-SEA TEMP (DEG C)	-08.9	(18 09)	-01.6	00.5	(25 15)	229	30
PRESSURE (MBAR)	1007.7	(01 00)	1016.3	1020.1	(18 15)	225	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 225

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		2.2	10.2	3.6			16.0	16.5
NE	1.3	8.0	8.9				18.2	10.2
E	.9	9.8	18.7				29.3	11.6
SE	.4	4.9	7.1				12.4	11.4
S		4.4	11.1	1.8			17.3	13.7
SW	.9	1.3	1.3				3.6	7.6
W		.4					.4	6.0
NW	.9	.9	.9				2.7	7.2
CALM								
TOTAL	4.4	37.0	58.2	5.3			100.0	12.2

MAX WIND — SPEED: 27 KNOTS; DIRECTION: 010 DEG; DAY: 18; HOUR: 12

JULY DATA SUMMARY 42010
AVERAGE LATITUDE 29.7N AVERAGE LONGITUDE 093.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	22.3	(05 21)	28.6	31.6	(10 00)	246	31
PRESSURE (MBAR)	1010.7	(06 03)	1016.7	1021.9	(08 18)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	2.0	.4				2.8	7.7
NE		1.6	1.6				3.3	11.3
E	.8	5.7	6.5				13.0	10.8
SE	2.0	9.5	8.5	.4			20.3	9.9
S	.8	24.9	8.5				34.1	8.7
SW	2.4	11.4	3.3				17.1	7.2
W	.4	2.8	.8	.4			4.5	9.9
NW	1.6	1.2	.8				3.7	6.2
CALM	1.2						1.2	.0
TOTAL	10.6	58.1	30.5	.8			100.0	8.8

MAX WIND — SPEED: 32 KNOTS; DIRECTION: 120 DEG; DAY: 10; HOUR: 21

JULY DATA SUMMARY 44003
AVERAGE LATITUDE 40.8N AVERAGE LONGITUDE 068.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.4	(03 09)	15.2	19.5	(21 21)	248	31
SEA TEMP (DEG C)	10.6	(01 00)	12.5	18.3	(27 00)	248	31
AIR-SEA TEMP (DEG C)	-02.1	(27 00)	02.7	06.8	(04 06)	248	31
PRESSURE (MBAR)	0998.9	(14 15)	1015.2	1031.3	(02 15)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.4	3.2					5.6	4.3
NE	2.4	1.6					4.0	3.5
E	1.2	6.9					8.1	5.8
SE	2.0	6.0	.4				8.5	5.7
S	1.2	13.3	4.0				18.5	7.8
SW	1.6	12.5	2.4				16.5	7.4
W	2.8	17.3	.8				21.0	6.4
NW	3.6	7.3	.4				11.3	5.4
CALM	6.5						6.5	.0
TOTAL	23.8	68.1	8.1				100.0	6.0

MAX WIND — SPEED: 15 KNOTS; DIRECTION: 190 DEG; DAY: 27; HOUR: 12

JULY DATA SUMMARY 44005
AVERAGE LATITUDE 42.7N AVERAGE LONGITUDE 068.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	13.9	(29 12)	19.6	22.3	(09 00)	248	31
SEA TEMP (DEG C)	14.3	(08 09)	17.0	20.4	(17 21)	248	31
AIR-SEA TEMP (DEG C)	-03.7	(29 12)	01.6	07.0	(09 00)	248	31
PRESSURE (MBAR)	0999.0	(14 15)	1015.0	1034.0	(02 12)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 249

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	4.4	7.3				12.9	9.9
NE	.8	4.8	.4				6.0	6.8
E		4.8	.8				5.6	7.7
SE	.4	5.2	2.0	.4			8.1	9.4
S		11.3	14.1	1.2			26.6	12.4
SW		3.2	9.3				12.5	12.6
W	.4	8.5	8.5				17.3	10.0
NW	.4	4.4	6.0				10.9	11.3
CALM								
TOTAL	3.2	46.8	48.4	1.6			100.0	10.7

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 130 DEG; DAY: 29; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	80.2	19.8							.6M	1.5M (21 18)

JULY DATA SUMMARY 44006
AVERAGE LATITUDE 36.3N AVERAGE LONGITUDE 075.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	21.5	(01 03)	25.6	30.9	(10 21)	235	31
SEA TEMP (DEG C)	21.7	(06 12)	25.8	28.9	(10 21)	234	31
AIR-SEA TEMP (DEG C)	-04.7	(30 15)	-00.2	04.1	(15 03)	234	31
PRESSURE (MBAR)	1005.6	(21 21)	1015.9	1025.0	(31 18)	235	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 235

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.9	5.1	6.0	.9			12.8	10.7
NE	.9	5.5	5.5				11.9	10.5
E	.9	7.2	3.0				11.1	8.5
SE	.9	4.7	2.1				7.7	8.1
S	.4	7.2	12.3	.4			20.4	12.6
SW	.9	7.2	9.8				17.9	10.8
W	.9	5.5	1.3				7.7	7.1
NW	.9	3.8	.4				5.1	7.1
CALM	5.5						5.5	.0
TOTAL	11.9	46.4	40.4	1.3			100.0	9.6

MAX WIND — SPEED: 24 KNOTS; DIRECTION: 180 DEG; DAY: 21; HOUR: 21

AUGUST DATA SUMMARY 42010
AVERAGE LATITUDE 29.7N AVERAGE LONGITUDE 093.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	24.2	(26 15)	26.7	31.0	(09 00)	248	31
PRESSURE (MBAR)	1009.2	(17 00)	1014.7	1020.5	(01 15)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	8.1	4.0				12.9	8.3
NE	.8	8.5	6.0				15.3	9.2
E	1.2	11.3	6.9				19.4	9.1
SE	1.2	10.5	4.4				16.1	6.9
S	.4	15.3	2.0				17.7	7.5
SW	1.6	6.9	1.2				9.7	6.7
W	.4	2.8	1.2				4.4	8.4
NW	.4	2.8	.8				4.0	7.3
CALM	.4						.4	.0
TOTAL	7.3	66.1	26.6				100.0	8.3

MAX WIND — SPEED: 19 KNOTS; DIRECTION: 150 DEG; DAY: 31; HOUR: 09

AUGUST DATA SUMMARY 44003
AVERAGE LATITUDE 40.8N AVERAGE LONGITUDE 068.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.7	(02 06)	16.0	19.9	(03 21)	246	31
SEA TEMP (DEG C)	12.6	(03 06)	14.3	16.1	(30 18)	246	31
AIR-SEA TEMP (DEG C)	-02.2	(27 03)	01.7	06.7	(03 18)	245	31
PRESSURE (MBAR)	1004.9	(17 09)	1016.6	1027.4	(29 12)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.6	1.6	.4				3.6	5.3
NE	.8	4.5	5.7				10.9	10.9
E	2.4	11.7		.4			14.6	5.9
SE	2.0	4.0					6.1	5.3
S	2.8	13.8	1.2				17.8	6.2
SW	1.6	9.7					11.3	5.7
W	4.5	13.0					17.4	5.5
NW	2.8	2.0	1.2				6.1	6.0
CALM	12.1						12.1	.0
TOTAL	30.8	60.3	8.5	.4			100.0	5.6

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 110 DEG; DAY: 23; HOUR: 18

AUGUST DATA SUMMARY 44005
AVERAGE LATITUDE 42.7N AVERAGE LONGITUDE 068.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	16.9	(30 06)	19.5	21.2	(01 03)	83	12
SEA TEMP (DEG C)	17.0	(02 06)	18.6	20.2	(28 18)	83	12
AIR-SEA TEMP (DEG C)	-02.2	(30 06)	00.9	03.8	(02 06)	83	12
PRESSURE (MBAR)	1004.5	(06 09)	1018.6	1027.4	(29 12)	83	12

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 83

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		3.6	1.2				4.8	9.0
NE		2.4					2.4	7.5
E	1.2	2.4	2.4				6.0	7.8
SE		7.2	1.2				8.4	9.1
S		22.9	14.5				37.3	10.2
SW		9.6	15.7				25.3	11.4
W	1.2	8.4	1.2				10.8	6.8
NW		2.4	2.4				4.8	9.3
CALM								
TOTAL	2.4	59.0	38.6				100.0	9.7

MAX WIND — SPEED: 16 KNOTS; DIRECTION: 240 DEG; DAY: 27; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 245

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	78.4	21.6							.5M	1.5M (25 21)

AUGUST DATA SUMMARY 44006
AVERAGE LATITUDE 36.3N AVERAGE LONGITUDE 075.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	20.0	(23 15)	23.9	26.9	(06 00)	248	31
SEA TEMP (DEG C)	20.3	(23 00)	24.4	27.6	(04 21)	247	31
AIR-SEA TEMP (DEG C)	-04.7	(19 21)	-00.5	03.7	(06 06)	247	31
PRESSURE (MBAR)	1003.5	(20 12)	1016.4	1024.7	(01 15)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		2.8	6.9	2.0			11.7	16.3
NE	.8	11.3	14.2	2.0			27.9	12.8
E	.4	7.3	3.6	1.2			12.6	11.4
SE		3.6	.8				4.5	9.5
S	.4	7.3	6.5				14.2	10.6
SW		6.5	9.7	.4			16.6	12.4
W	.4	5.7	.8				6.9	7.4
NW		2.0	1.6				3.6	10.7
CALM	2.0						2.0	.0
TOTAL	3.6	46.6	44.1	5.7			100.0	11.8

MAX WIND — SPEED: 32 KNOTS; DIRECTION: 360 DEG; DAY: 20; HOUR: 18

SEPTEMBER DATA SUMMARY 42010
AVERAGE LATITUDE 29.7N AVERAGE LONGITUDE 093.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	16.8	(10 12)	26.1	30.7	(08 21)	233	30
PRESSURE (MBAR)	1009.2	(02 03)	1016.5	1027.7	(18 18)	233	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 233

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	10.7	8.6	2.1			21.9	11.4
NE	2.6	6.6	6.9				16.0	8.8
E	1.3	8.6	6.4				16.3	9.6
SE	3.0	9.4	3.4				15.9	7.3
S	1.3	7.3	6.0	.4			15.0	10.2
SW		3.0	.4				3.4	6.5
W		1.7	.9				2.6	10.5
NW	.9	1.7	.9	.4			3.9	8.8
CALM	3.0						3.0	.0
TOTAL	12.4	51.1	33.5	3.0			100.0	9.2

MAX WIND — SPEED: 25 KNOTS; DIRECTION: 360 DEG; DAY: 18; HOUR: 06

SEPTEMBER DATA SUMMARY 44003
AVERAGE LATITUDE 40.8N AVERAGE LONGITUDE 068.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.3	(29 15)	16.3	20.2	(14 18)	235	30
SEA TEMP (DEG C)	14.3	(30 06)	15.9	19.3	(12 15)	235	30
AIR-SEA TEMP (DEG C)	-05.0	(29 12)	00.4	04.0	(16 18)	235	30
PRESSURE (MBAR)	0997.4	(19 21)	1013.8	1023.6	(26 15)	235	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 236

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	3.0	9.7				13.6	11.6
NE		4.2	12.3				16.5	13.4
E	.8	3.4	3.4				7.6	10.8
SE		3.4	2.1				5.5	9.5
S	1.3	7.6	3.0				11.9	8.2
SW	.4	6.4	6.4				13.1	10.5
W	3.0	5.5	7.2	.4			16.1	9.8
NW	.8	3.4	5.1	3.8			12.7	15.6
CALM	3.0						3.0	.0
TOTAL	9.7	36.9	49.2	4.2			100.0	11.0

MAX WIND — SPEED: 25 KNOTS; DIRECTION: 330 DEG; DAY: 29; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 66

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	12.1	28.8	37.9	19.7	1.5				2.0M	4.5M (29 09)

SEPTEMBER DATA SUMMARY 44005
AVERAGE LATITUDE 42.7N AVERAGE LONGITUDE 068.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.2	(30 15)	16.9	20.8	(14 21)	237	30
SEA TEMP (DEG C)	13.8	(30 21)	17.1	19.6	(07 15)	239	30
AIR-SEA TEMP (DEG C)	-05.1	(29 18)	-00.1	02.6	(20 06)	239	30
PRESSURE (MBAR)	0993.6	(19 21)	1015.6	1023.2	(26 15)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	3.4	11.4	1.3			16.5	15.0
NE	.4	3.4	8.4	1.3			13.5	14.7
E		2.1	9.3				11.4	14.0
SE		2.5	4.2	.8			7.6	13.4
S	.4	1.7	7.2	1.3			10.5	14.3
SW	.4	3.0	10.1	.8			14.3	13.5
W		3.0	6.8	4.6			14.3	16.9
NW		2.1	4.2	5.1			11.4	19.0
CALM	.4						.4	.0
TOTAL	2.1	21.1	61.6	15.2			100.0	15.1

MAX WIND — SPEED: 32 KNOTS; DIRECTION: 270 DEG; DAY: 30; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 235

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	40.9	46.0	13.2						1.0M	2.5M (06 06)

SEPTEMBER DATA SUMMARY 44006
AVERAGE LATITUDE 36.3N AVERAGE LONGITUDE 075.4W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	15.7	(24 15)	21.8	28.9	(16 18)	237	30
SEA TEMP (DEG C)	20.7	(27 12)	22.7	25.7	(13 21)	236	30
AIR-SEA TEMP (DEG C)	-06.7	(19 15)	-00.9	02.1	(16 18)	236	30
PRESSURE (MBAR)	1007.1	(09 00)	1016.1	1025.1	(26 15)	237	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 236

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	6.8	10.6	1.3			19.1	12.9
NE		7.6	10.6				18.2	11.8
E		2.5	.4				3.0	9.4
SE	.4	3.8	.4				4.7	8.7
S	.8	5.1	11.4				17.4	12.4
SW		5.5	11.4				16.9	12.4
W	.8	3.8	4.2	.4			9.3	11.8
NW	.4		6.8	1.3			8.5	17.7
CALM	3.0						3.0	.0
TOTAL	5.9	35.2	55.9	3.0			100.0	12.1

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 350 DEG; DAY: 23; HOUR: 12

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JULY                          D A T A    S U M M A R Y                          45001
         AVERAGE LATITUDE  48.5N                   AVERAGE LONGITUDE  087.5W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   04.3    (05 09)   |   08.8   |   14.3   (16 00)   |  248   |    31
   SEA  TEMP (DEG C)   03.4    (02 09)   |   05.9   |   11.8   (28 21)   |  248   |    31
 AIR-SEA TEMP (DEG C)  00.7    (20 15)   |   02.9   |   10.0   (07 21)   |  248   |    31
   PRESSURE  (MBAR)  1006.5    (20 12)   |  1016.7  |  1029.2  (01 15)   |  248   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  248
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |   .8    3.7                         |   4.0 |  5.9        MAX WIND
  NE  |  1.6    3.2    .8                   |   5.6 |  6.2     SPEED:  14 KNOTS
  E   |  1.6    4.8                         |   6.5 |  5.1     DIRECTION: 190 DEG
  SE  |  2.4   10.1                         |  12.5 |  5.7     DAY:    20
  S   |  3.2   22.6   1.2                   |  27.0 |  6.5     HOUR:   18
  SW  |  2.8   10.5   2.4                   |  15.7 |  6.6
  W   |  2.0   16.1    .4                   |  18.5 |  6.5
  NW  |   .8    4.4                         |   5.2 |  5.9
 CALM |  4.8                                |   4.8 |   .0
 TOTAL| 20.2   75.0   4.8                   | 100.0 |  5.9
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  248
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 92.7  7.3                                     |  .3M   1.0M (31 21)
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JULY                          D A T A    S U M M A R Y                          45002
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  086.3W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   12.1    (21 12)   |   17.8   |   21.8   (20 00)   |  247   |    31
   SEA  TEMP (DEG C)   10.9    (01 15)   |   17.3   |   20.5   (20 00)   |  247   |    31
 AIR-SEA TEMP (DEG C) -05.2    (21 12)   |   00.5   |   03.9   (03 21)   |  247   |    31
   PRESSURE  (MBAR)  1005.7    (21 09)   |  1016.9  |  1026.6  (27 15)   |  246   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  1.6   10.5   5.7                   |  17.8 |  6.7        MAX WIND
  NE  |   .8    8.5   1.2                   |  10.5 |  7.5     SPEED:  17 KNOTS
  E   |  2.4    4.5                         |   6.9 |  5.0     DIRECTION: 350 DEG
  SE  |  1.2    2.8    .4                   |   4.5 |  4.5     DAY:    21
  S   |  2.4    7.7   1.2                   |  11.7 |  6.0     HOUR:   09
  SW  |  4.5   17.8   9.3                   |  31.6 |  8.4
  W   |  3.2    7.3                         |  10.5 |  4.5
  NW  |  1.6    2.8    .4                   |   4.9 |  5.3
 CALM |  2.0                                |   2.0 |   .0
 TOTAL| 19.8   61.9  18.2                   | 100.0 |  7.0
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  246
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 75.6 24.0    .4                               |  .5M   2.0M (21 09)
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JULY                          D A T A    S U M M A R Y                          45003
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  082.8W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   07.4    (03 09)   |   14.6   |   20.2   (09 00)   |  247   |    31
   SEA  TEMP (DEG C)   04.4    (02 00)   |   12.3   |   17.3   (21 03)   |  247   |    31
 AIR-SEA TEMP (DEG C) -00.9    (26 12)   |   02.4   |   08.7   (06 21)   |  247   |    31
   PRESSURE  (MBAR)  1003.6    (21 00)   |  1016.8  |  1026.7  (01 15)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  1.6    2.8   1.6                   |   6.1 |  6.9        MAX WIND
  NE  |         3.2    .4                   |   3.6 |  8.2     SPEED:  18 KNOTS
  E   |  1.2    8.5                         |   9.7 |  6.7     DIRECTION: 280 DEG
  SE  |  4.0    6.9                         |  10.9 |  4.1     DAY:    09
  S   |  2.4   10.1    .8                   |  13.4 |  6.2     HOUR:   18
  SW  |  3.2    7.7    .8                   |  11.7 |  5.8
  W   |  2.8   20.6   4.5                   |  27.9 |  7.5
  NW  |  2.0    9.7   2.4                   |  14.2 |  7.4
 CALM |  2.4                                |   2.4 |   .0
 TOTAL| 19.8   69.6  10.5                   | 100.0 |  6.4
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  218
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 83.9 14.7   1.4                               |  .4M   2.0M (27 06)
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JULY                          D A T A    S U M M A R Y                          45004
         AVERAGE LATITUDE  47.2N                   AVERAGE LONGITUDE  086.5W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   04.5    (05 09)   |   08.3   |   16.1   (30 00)   |  247   |    31
   SEA  TEMP (DEG C)   03.2    (02 09)   |   04.3   |   08.6   (28 00)   |  247   |    31
 AIR-SEA TEMP (DEG C)  01.2    (13 15)   |   04.0   |   12.1   (07 21)   |  247   |    31
   PRESSURE  (MBAR)  1006.7    (20 15)   |  1017.0  |  1028.8  (01 15)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  1.2    5.7                         |   6.9 |  5.8        MAX WIND
  NE  |  1.2    2.4                         |   3.6 |  5.1     SPEED:  15 KNOTS
  E   |  1.2    5.7                         |   6.9 |  5.8     DIRECTION: 290 DEG
  SE  |  2.0    6.1                         |   8.1 |  5.9     DAY:    28
  S   |  2.4   15.4   4.2                   |  21.9 |  7.5     HOUR:   04
  SW  |  2.4    7.3   1.2                   |  10.9 |  6.4
  W   |  3.2    9.7    .8                   |  13.8 |  6.8
  NW  |  1.2    8.1                         |   9.3 |  6.1
 CALM | 19.0                                |  19.0 |   .0
 TOTAL| 38.0   55.9   6.1                   | 100.0 |  5.2
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  245
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 95.5  4.5                                     |  .2M   1.0M (31 18)
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AUGUST                        D A T A    S U M M A R Y                          45001
         AVERAGE LATITUDE  48.0N                   AVERAGE LONGITUDE  087.6W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   11.0    (02 15)   |   15.2   |   18.3   (28 00)   |  247   |    31
   SEA  TEMP (DEG C)   09.7    (01 12)   |   14.5   |   17.9   (31 00)   |  247   |    31
 AIR-SEA TEMP (DEG C) -01.9    (27 03)   |   00.8   |   04.4   (01 12)   |  247   |    31
   PRESSURE  (MBAR)  1006.2    (31 21)   |  1015.9  |  1025.0  (16 15)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  5.7    6.9   1.6                   |  14.2 |  5.3        MAX WIND
  NE  |   .8    6.5    .4                   |   7.7 |  5.6     SPEED:  17 KNOTS
  E   |  2.6   17.8   2.0                   |  23.5 |  6.6     DIRECTION: 360 DEG
  SE  |  3.6   14.6   1.2                   |  19.4 |  6.0     DAY:    24
  S   |  1.6    8.5    .8                   |  10.9 |  6.3     HOUR:   06
  SW  |   .8    2.4                         |   3.2 |  4.8
  W   |  2.0    4.0   1.2                   |   7.3 |  6.3
  NW  |  2.4    6.5   1.2                   |  10.1 |  6.1
 CALM |  3.6                                |   3.6 |   .0
 TOTAL| 24.3   67.2   8.5                   | 100.0 |  5.8
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  246
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 82.1 17.9                                     |  .4M   1.5M (29 09)
-------------------------------------------------------------------------------------
```

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AUGUST                        D A T A    S U M M A R Y                          45002
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  086.3W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   15.3    (16 03)   |   19.2   |   21.3   (22 00)   |  247   |    31
   SEA  TEMP (DEG C)   17.5    (17 12)   |   19.4   |   21.0   (21 21)   |  247   |    31
 AIR-SEA TEMP (DEG C) -04.1    (16 03)   |  -00.2   |   02.2   (01 00)   |  247   |    31
   PRESSURE  (MBAR)  1003.2    (07 21)   |  1016.3  |  1024.1  (21 15)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  2.0    6.9   5.3                   |  14.2 |  8.2        MAX WIND
  NE  |  2.0    7.3   2.4                   |  11.7 |  7.4     SPEED:  17 KNOTS
  E   |  2.8    9.3   3.6                   |  15.8 |  7.5     DIRECTION: 340 DEG
  SE  |         4.9    .4                   |   5.3 |  7.0     DAY:    16
  S   |  2.4   10.1   2.8                   |  15.4 |  7.2     HOUR:   00
  SW  |  3.6   15.8   8.1                   |  27.5 |  8.3
  W   |  2.4    2.8                         |   5.3 |  4.1
  NW  |   .8    1.2    .4                   |   2.4 |  5.8
 CALM |  2.4                                |   2.4 |   .0
 TOTAL| 18.6   58.3  23.1                   | 100.0 |  7.3
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  246
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 75.2 24.0    .8                               |  .5M   2.0M (16 12)
-------------------------------------------------------------------------------------
```

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AUGUST                        D A T A    S U M M A R Y                          45003
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  082.0W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   14.8    (16 15)   |   18.0   |   21.5   (24 00)   |  247   |    31
   SEA  TEMP (DEG C)   14.3    (01 12)   |   17.4   |   19.6   (31 21)   |  247   |    31
 AIR-SEA TEMP (DEG C) -01.8    (16 09)   |   00.6   |   03.6   (06 21)   |  247   |    31
   PRESSURE  (MBAR)  1003.9    (06 00)   |  1016.1  |  1024.3  (25 15)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  247
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  1.2    4.5   2.8                   |   8.5 |  8.0        MAX WIND
  NE  |   .8    4.0    .4                   |   5.3 |  5.5     SPEED:  15 KNOTS
  E   |  2.0    6.5   4.0                   |  12.6 |  7.9     DIRECTION: 100 DEG
  SE  |  2.4    8.9                         |  11.3 |  6.0     DAY:    28
  S   |  2.8   18.2   4.5                   |  25.5 |  6.9     HOUR:   21
  SW  |  2.4    6.5                         |   8.9 |  5.5
  W   |  4.0    7.7    .4                   |  12.6 |  5.1
  NW  |  1.2    8.5    .4                   |  10.1 |  6.6
 CALM |  5.3                                |   5.3 |   .0
 TOTAL| 22.3   64.8  13.0                   | 100.0 |  6.2
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  204
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 76.0 23.0   1.0                               |  .5M   2.0M (29 03)
-------------------------------------------------------------------------------------
```

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AUGUST                        D A T A    S U M M A R Y                          45004
         AVERAGE LATITUDE  47.2N                   AVERAGE LONGITUDE  086.5W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   09.1    (03 06)   |   14.6   |   18.2   (22 21)   |  247   |    31
   SEA  TEMP (DEG C)   06.4    (02 09)   |   12.6   |   17.3   (31 21)   |  248   |    31
 AIR-SEA TEMP (DEG C) -00.9    (27 09)   |   02.0   |   08.7   (02 03)   |  247   |    31
   PRESSURE  (MBAR)  1006.9    (07 12)   |  1015.9  |  1023.7  (15 18)   |  247   |    31
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  248
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  3.2    5.7   2.4                   |  11.3 |  7.0        MAX WIND
  NE  |  1.6    4.0    .8                   |   6.5 |  6.3     SPEED:  16 KNOTS
  E   |  2.0    7.3   2.4                   |  11.7 |  7.9     DIRECTION: 350 DEG
  SE  |  2.8    6.5   1.6                   |  10.9 |  6.5     DAY:    15
  S   |  3.2   11.7   1.2                   |  16.1 |  6.1     HOUR:   15
  SW  |   .4    7.3   2.8                   |  10.5 |  8.1
  W   |  2.4    3.2                         |   5.6 |  3.7
  NW  |  2.0    6.0                         |   8.1 |  5.9
 CALM | 19.4                                |  19.4 |   .0
 TOTAL| 37.1   51.2  11.7                   | 100.0 |  5.3
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  246
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 82.6 17.4                                     |  .4M   1.5M (27 18)
-------------------------------------------------------------------------------------
```

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SEPTEMBER                     D A T A    S U M M A R Y                          45001
         AVERAGE LATITUDE  48.0N                   AVERAGE LONGITUDE  087.6W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   02.9    (28 15)   |   11.5   |   16.6   (01 06)   |  238   |    30
   SEA  TEMP (DEG C)   05.9    (30 18)   |   12.4   |   17.3   (01 03)   |  238   |    30
 AIR-SEA TEMP (DEG C) -04.9    (02 09)   |  -00.9   |   04.1   (13 00)   |  238   |    30
   PRESSURE  (MBAR)  0993.4    (27 15)   |  1015.8  |  1029.7  (23 12)   |  238   |    30
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  211
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  2.4    8.5   6.6                   |  17.5 |  8.8        MAX WIND
  NE  |   .9    5.7   4.3                   |  10.9 |  9.6     SPEED:  21 KNOTS
  E   |   .5    8.1   4.3                   |  12.8 |  9.5     DIRECTION: 290 DEG
  SE  |  1.9    7.6   3.8                   |  13.3 |  8.6     DAY:    01
  S   |  1.4    4.7   3.8                   |  10.0 |  9.5     HOUR:   18
  SW  |   .9    6.2   1.9                   |   9.0 |  6.9
  W   |   .9    4.7   7.6                   |  13.3 | 12.0
  NW  |   .9    4.3   7.1                   |  12.3 | 10.5
 CALM |   .9                                |    .9 |   .0
 TOTAL| 10.9   49.8  39.3                   | 100.0 |  9.4
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  221
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 38.0 45.2  11.3   2.7   2.7                   | 1.1M   5.8M (27 18)
-------------------------------------------------------------------------------------
```

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SEPTEMBER                     D A T A    S U M M A R Y                          45002
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  086.3W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   07.2    (29 09)   |   14.5   |   20.5   (01 06)   |  240   |    30
   SEA  TEMP (DEG C)   10.4    (30 12)   |   16.2   |   20.1   (01 00)   |  240   |    30
 AIR-SEA TEMP (DEG C) -05.8    (02 15)   |  -01.7   |   02.4   (27 03)   |  240   |    30
   PRESSURE  (MBAR)  1001.5    (18 06)   |  1016.5  |  1031.8  (23 15)   |  240   |    30
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  240
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |   .8   10.8  11.7                   |  23.3 | 10.7        MAX WIND
  NE  |   .8    5.4   2.9                   |   9.2 |  8.6     SPEED:  27 KNOTS
  E   |  3.3    4.2   2.1                   |   9.6 |  7.0     DIRECTION: 290 DEG
  SE  |   .8    2.9    .4                   |   4.2 |  6.5     DAY:    26
  S   |   .4    7.9   2.5                   |  10.8 |  8.5     HOUR:   03
  SW  |   .4    5.8   9.2    .4             |  15.8 | 12.2
  W   |   .8    6.3   3.8   2.1             |  12.9 | 12.0
  NW  |   .8    5.4   7.1                   |  13.3 | 10.7
 CALM |   .8                                |    .8 |   .0
 TOTAL|  9.2   48.8  39.6   2.5             | 100.0 | 10.0
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  239
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 49.4 43.9   5.0   1.7                         |  .9M   3.0M (20 03)
-------------------------------------------------------------------------------------
```

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SEPTEMBER                     D A T A    S U M M A R Y                          45003
         AVERAGE LATITUDE  45.3N                   AVERAGE LONGITUDE  082.6W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   06.8    (29 09)   |   13.9   |   20.7   (01 21)   |  239   |    30
   SEA  TEMP (DEG C)   09.0    (29 03)   |   15.7   |   19.6   (01 21)   |  239   |    30
 AIR-SEA TEMP (DEG C) -06.4    (09 09)   |  -01.7   |   02.4   (27 03)   |  239   |    30
   PRESSURE  (MBAR)  0999.8    (10 09)   |  1015.0  |  1029.7  (23 18)   |  239   |    30
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  239
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |   .8   10.9   4.6                   |  16.3 |  8.9        MAX WIND
  NE  |   .4    7.5   4.6                   |  12.6 |  9.6     SPEED:  29 KNOTS
  E   |   .4    2.1   1.3                   |   3.8 |  9.3     DIRECTION: 280 DEG
  SE  |         1.7   2.5                   |   4.2 | 10.1     DAY:    28
  S   |   .8    5.4   5.0                   |  11.3 | 10.4     HOUR:   06
  SW  |   .8    5.4   5.0                   |  11.3 |  9.7
  W   |  1.3    8.4   7.5   2.1             |  19.2 | 12.1
  NW  |   .4   10.5  10.0    .4             |  21.3 | 10.9
 CALM |                                     |       |
 TOTAL|  5.0   51.9  40.6   2.5             | 100.0 | 10.4
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  196
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 32.1 53.1  10.7   2.6   1.5                   | 1.1M   4.0M (28 09)
-------------------------------------------------------------------------------------
```

```
SEPTEMBER                     D A T A    S U M M A R Y                          45004
         AVERAGE LATITUDE  47.2N                   AVERAGE LONGITUDE  086.5W
-------------------------------------------------------------------------------------
MEANS AND EXTREMES                       |          |                    | NO. OF | DAYS WITH
                        MIN     (DA HR)  |   MEAN   |    MAX   (DA HR)   |  OBS   |   DATA
   AIR  TEMP (DEG C)   03.7    (28 18)   |   11.9   |   19.4   (01 03)   |  238   |    30
   SEA  TEMP (DEG C)   06.8    (30 21)   |   12.6   |   17.4   (01 00)   |  238   |    30
 AIR-SEA TEMP (DEG C) -04.7    (22 18)   |  -00.8   |   02.7   (13 06)   |  238   |    30
   PRESSURE  (MBAR)  0997.9    (27 15)   |  1015.5  |  1030.6  (23 12)   |  238   |    30
-------------------------------------------------------------------------------------
WIND - % FREQUENCIES, MEANS AND EXTREMES
      |------- SPEED   (KNOTS)-------------|-------| MEAN
 ---- |          4-    11-   22-   34-      | TOTAL | SPEED     NO. OF OBS:  238
 DIR  |  <4      10    21    33    47  >47  |   %   |(KNOTS)
 ---- |                                     |       |
  N   |  1.3    7.6  10.1                   |  18.9 | 10.3        MAX WIND
  NE  |         7.1   4.6                   |  11.8 |  9.3     SPEED:  31 KNOTS
  E   |   .8    3.4   4.2                   |   8.4 | 10.0     DIRECTION: 260 DEG
  SE  |         3.4   2.9                   |   6.3 | 10.6     DAY:    27
  S   |   .4    6.0   5.9                   |  10.5 | 10.7     HOUR:   18
  SW  |   .4    3.4   3.4    .8             |   8.4 | 10.6
  W   |  1.3    5.5   4.6   1.7             |  13.0 | 11.6
  NW  |   .8    3.4  11.8   1.3             |  17.2 | 13.7
 CALM |  5.5                                |   5.5 |   .0
 TOTAL| 10.9   38.2  47.1   3.8             | 100.0 | 10.4
-------------------------------------------------------------------------------------
WAVES - % FREQUENCIES, MEAN AND EXTREME  (METERS)            NO. OF WAVE OBS:  235
HEIGHT (M)  <1   1-1.5 2-2.5 3-3.5 4-5.5 6-7.5 8-9.5 >9.5 | MEAN   MAX  (DA HR)
% FREQUENCY 40.0 47.7   8.9    .9   2.6                   | 1.1M   5.0M (20 06)
-------------------------------------------------------------------------------------
```

JULY — DATA SUMMARY — 45005

AVERAGE LATITUDE 41.7N — AVERAGE LONGITUDE 082.5W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	17.6	(29 12)	23.1	29.6	(08 21)	246	31
SEA TEMP (DEG C)	20.4	(01 09)	23.8	26.5	(19 00)	246	31
AIR-SEA TEMP (DEG C)	-05.9	(22 06)	-00.7	04.9	(08 21)	246	31
PRESSURE (MBAR)	1002.5	(20 21)	1016.3	1026.8	(31 15)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.2	1.6				2.8	10.9
NE	.4	7.3	2.8				10.6	9.2
E	2.8	8.5	9.3				20.7	9.3
SE	.4	9.5	2.4				11.9	8.2
S	3.3	12.2	5.3				20.7	8.0
SW	3.3	9.8	5.7	.4			19.1	9.1
W		3.3	1.2	.4			4.9	10.3
NW		1.2	.4				1.6	8.3
CALM	7.7						7.7	.0
TOTAL	18.3	52.0	28.9	.8			100.0	8.2

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 230 DEG; DAY: 26; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	74.4	25.6							.5M	1.5M (29 15)

JULY — DATA SUMMARY — 45006

AVERAGE LATITUDE 47.3N — AVERAGE LONGITUDE 090.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	05.6	(03 09)	13.7	22.4	(11 00)	247	31
SEA TEMP (DEG C)	05.0	(02 09)	12.2	17.3	(30 00)	240	31
AIR-SEA TEMP (DEG C)	-02.8	(19 03)	01.5	10.6	(11 00)	240	31
PRESSURE (MBAR)	1006.9	(20 12)	1017.0	1027.4	(27 15)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.6	3.3					4.9	5.1
NE	.8	5.7	.4				6.9	6.0
E	4.9	12.6	2.4				19.9	6.3
SE	1.6	5.7					7.3	5.1
S	2.8	13.8	2.0				18.7	6.4
SW	.4	15.9	.8				17.1	6.4
W	1.2	6.9	1.2				9.3	7.3
NW	2.8	2.0					4.9	3.4
CALM	11.0						11.0	.0
TOTAL	27.2	65.9	6.9				100.0	5.4

MAX WIND — SPEED: 15 KNOTS; DIRECTION: 220 DEG; DAY: 31; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 245

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	96.3	3.7							.2M	1.0M (31 18)

JULY — DATA SUMMARY — 45007

AVERAGE LATITUDE 42.7N — AVERAGE LONGITUDE 087.1W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	14.4	(28 15)	19.6	23.5	(19 00)	128	17
SEA TEMP (DEG C)	19.3	(29 12)	20.3	21.9	(20 21)	128	17
AIR-SEA TEMP (DEG C)	-05.0	(28 15)	-00.7	01.6	(19 00)	128	17
PRESSURE (MBAR)	1004.6	(21 00)	1016.9	1025.7	(31 15)	128	17

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 128

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		7.0	11.7				18.8	12.8
NE		5.5	5.5	.8			11.7	12.3
E	2.3	11.7	7.8				21.9	8.4
SE	3.1	7.0	1.6				11.7	6.9
S	.8	21.1	.8				22.7	6.6
SW	.8	1.6					2.3	4.0
W		.8					.8	8.0
NW		.8					.8	5.0
CALM	9.4						9.4	.0
TOTAL	16.4	55.5	27.3	.8			100.0	8.2

MAX WIND — SPEED: 22 KNOTS; DIRECTION: 030 DEG; DAY: 21; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 54

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	72.2	18.5	9.3						.6M	2.5M (21 21)

JULY — DATA SUMMARY — 46001

AVERAGE LATITUDE 56.0N — AVERAGE LONGITUDE 148.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.0	(01 12)	12.0	13.8	(31 18)	248	31
SEA TEMP (DEG C)	10.2	(01 06)	12.5	13.7	(31 21)	248	31
AIR-SEA TEMP (DEG C)	-02.3	(14 00)	-00.5	01.8	(02 21)	248	31
PRESSURE (MBAR)	0994.5	(01 21)	1018.3	1029.2	(22 06)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	1.2	.4				2.0	7.4
NE	.4	.4					.8	3.0
E			.8				.8	20.0
SE		.4	4.4				4.8	14.3
S		2.4	15.3				17.7	13.7
SW		9.7	22.2				31.9	11.8
W	1.2	8.1	23.8	1.6			34.7	13.2
NW		6.9	.4				7.3	7.0
CALM								
TOTAL	2.0	29.0	67.3	1.6			100.0	12.3

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 260 DEG; DAY: 23; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	5.6	58.9	29.8	3.6	2.0				1.6M	5.0M (07 09)

AUGUST — DATA SUMMARY — 45005

AVERAGE LATITUDE 41.7N — AVERAGE LONGITUDE 082.5W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	18.3	(17 03)	22.4	26.2	(04 21)	247	31
SEA TEMP (DEG C)	22.2	(26 12)	23.2	25.0	(02 21)	247	31
AIR-SEA TEMP (DEG C)	-04.9	(17 03)	-00.8	02.3	(28 21)	247	31
PRESSURE (MBAR)	1003.2	(08 00)	1016.4	1025.0	(01 15)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		.8	1.6				2.4	11.9
NE		.8	1.6				2.4	12.2
E	2.0	9.5	6.9	.4			17.8	10.0
SE	1.6	8.9	4.5				15.0	8.1
S	2.8	10.9	6.9				20.6	8.6
SW	.8	12.6	15.0				28.3	11.1
W	1.2	3.6	2.0				6.9	8.6
NW		1.2	2.0				3.2	10.9
CALM	3.2						3.2	.0
TOTAL	11.7	47.4	40.5	.4			100.0	9.4

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 070 DEG; DAY: 17; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	78.1	21.5	.4						.5M	2.0M (17 03)

AUGUST — DATA SUMMARY — 45006

AVERAGE LATITUDE 47.3N — AVERAGE LONGITUDE 090.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	14.9	(03 03)	17.7	20.9	(23 21)	246	31
SEA TEMP (DEG C)	15.4	(01 00)	17.5	19.5	(24 03)	242	31
AIR-SEA TEMP (DEG C)	-02.2	(03 00)	00.2	02.7	(01 03)	242	31
PRESSURE (MBAR)	1005.1	(31 21)	1016.4	1026.5	(16 18)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	4.5	.4				6.1	6.0
NE	1.6	17.9	.8				20.3	6.6
E	2.8	14.2	2.4				19.5	7.2
SE	.8	8.9	.4				10.2	6.7
S	3.3	4.5					7.7	4.4
SW	2.8	17.1	.8				20.7	6.0
W	2.0	6.5					8.5	4.8
NW	1.2	.8					2.0	2.8
CALM	4.9						4.9	.0
TOTAL	20.7	74.4	4.9				100.0	5.8

MAX WIND — SPEED: 18 KNOTS; DIRECTION: 230 DEG; DAY: 01; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	81.3	17.1	1.6						.5M	2.0M (25 00)

AUGUST — DATA SUMMARY — 45007

AVERAGE LATITUDE 42.7N — AVERAGE LONGITUDE 087.1W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	17.1	(16 09)	21.1	24.5	(24 18)	246	31
SEA TEMP (DEG C)	20.1	(18 12)	21.1	23.1	(24 21)	246	31
AIR-SEA TEMP (DEG C)	-03.4	(16 09)	00.0	02.7	(24 18)	246	31
PRESSURE (MBAR)	1002.9	(08 00)	1016.1	1023.8	(01 12)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	6.1	2.8				9.3	9.3
NE	.4	4.5	1.6				6.5	8.9
E	2.8	10.1	.4				13.4	6.5
SE	1.6	8.9	2.0				12.6	7.7
S	.4	15.8	5.3	.4			21.9	8.5
SW	1.6	13.8	2.4				17.8	7.8
W	.4	9.3	2.4				12.1	8.0
NW		3.6	.8				4.5	8.4
CALM	2.0						2.0	.0
TOTAL	9.7	72.1	17.8	.4			100.0	7.9

MAX WIND — SPEED: 22 KNOTS; DIRECTION: 200 DEG; DAY: 14; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 160

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	66.9	26.9	6.3						.7M	2.0M (17 06)

AUGUST — DATA SUMMARY — 46001

AVERAGE LATITUDE 56.0N — AVERAGE LONGITUDE 148.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.5	(21 12)	13.0	14.6	(08 03)	248	31
SEA TEMP (DEG C)	12.6	(22 15)	13.8	14.8	(01 06)	248	31
AIR-SEA TEMP (DEG C)	-02.2	(21 12)	-00.8	00.8	(08 03)	248	31
PRESSURE (MBAR)	0981.3	(20 21)	1009.6	1026.3	(10 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.2	1.2				2.4	8.9
NE	.8	2.8	3.2				6.9	9.5
E	.8	4.0	3.2				8.1	9.0
SE	1.6	2.8	7.7				12.1	11.4
S	1.6	2.0	16.1	1.2			21.0	13.6
SW		9.7	20.2	.8			30.2	12.5
W		3.6	10.5	2.0			16.1	14.0
NW		1.2	1.2				2.4	10.0
CALM	.8						.8	.0
TOTAL	5.6	27.0	63.3	3.6			100.0	12.1

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 190 DEG; DAY: 20; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	2.0	45.2	39.1	7.7	6.0				2.0M	5.5M (21 12)

SEPTEMBER — DATA SUMMARY — 45005

AVERAGE LATITUDE 41.7N — AVERAGE LONGITUDE 082.5W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.3	(28 15)	17.9	24.8	(11 21)	235	30
SEA TEMP (DEG C)	16.4	(30 21)	20.1	23.7	(01 18)	235	30
AIR-SEA TEMP (DEG C)	-08.1	(09 18)	-02.2	04.2	(27 00)	235	30
PRESSURE (MBAR)	1003.8	(19 21)	1015.7	1028.9	(23 15)	235	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 236

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	4.2	1.3				6.4	9.2
NE		3.8	3.4	.4			7.6	11.2
E	.4	3.0	4.7				8.1	12.7
SE	.8	4.2	3.0				8.1	8.9
S	1.3	11.9	7.6				20.8	9.6
SW		3.8	13.1	4.2			21.2	16.2
W	.4	3.4	11.4	.8			16.1	13.9
NW		4.7	3.8				8.5	10.7
CALM	3.4						3.4	.0
TOTAL	7.2	39.0	48.3	5.5			100.0	11.7

MAX WIND — SPEED: 27 KNOTS; DIRECTION: 220 DEG; DAY: 28; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 234

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	54.7	41.9	3.4						.5M	2.0M (28 06)

SEPTEMBER — DATA SUMMARY — 45006

AVERAGE LATITUDE 47.3N — AVERAGE LONGITUDE 090.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.5	(28 15)	13.5	20.5	(18 00)	240	30
SEA TEMP (DEG C)	07.0	(30 18)	14.3	18.2	(01 06)	222	30
AIR-SEA TEMP (DEG C)	-08.3	(16 21)	-01.0	04.4	(10 00)	222	30
PRESSURE (MBAR)	0995.6	(26 21)	1016.9	1031.3	(17 15)	240	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	10.1	2.9				13.9	7.9
NE	1.3	3.8	.4				5.5	6.5
E	1.7	16.8	6.3				24.8	8.6
SE	1.3	5.0	.4				6.7	6.8
S	.4	4.2	.8				5.5	7.4
SW		5.9	5.9				11.8	11.0
W	1.3	11.3	4.2	2.1			18.9	10.8
NW	1.7	5.9	4.2				11.8	9.4
CALM	1.3						1.3	.0
TOTAL	9.7	63.0	25.2	2.1			100.0	8.9

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 260 DEG; DAY: 27; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 235

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	43.4	48.1	5.1	2.6	.4				.9M	4.0M (27 12)

SEPTEMBER — DATA SUMMARY — 45007

AVERAGE LATITUDE 42.7N — AVERAGE LONGITUDE 087.1W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.6	(28 18)	17.2	23.4	(01 03)	238	30
SEA TEMP (DEG C)	14.7	(30 12)	18.8	21.7	(19 00)	238	30
AIR-SEA TEMP (DEG C)	-08.8	(17 15)	-01.7	02.6	(27 03)	238	30
PRESSURE (MBAR)	1006.8	(01 09)	1016.6	1031.1	(23 18)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	5.0	12.2				18.1	11.9
NE	1.3	8.4	8.4				18.1	9.8
E	.8	5.0	2.5	.4			8.8	9.4
SE	2.1	4.2	5.5				11.8	9.3
S	1.3	5.0	5.9				12.2	10.8
SW	.4	3.8	7.1				11.3	11.6
W	1.7	1.7	5.9	.4			9.7	12.0
NW	.8	2.5	3.8	.8			8.0	11.8
CALM	2.1						2.1	.0
TOTAL	11.3	35.7	51.3	1.7			100.0	10.5

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 300 DEG; DAY: 28; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 235

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	27.2	53.2	17.0	2.6					1.2M	3.0M (28 03)

SEPTEMBER — DATA SUMMARY — 46001

AVERAGE LATITUDE 56.0N — AVERAGE LONGITUDE 148.0W

MEANS AND EXTREMES

	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	06.2	(30 18)	11.1	13.6	(06 00)	236	30
SEA TEMP (DEG C)	10.6	(30 21)	12.8	13.5	(10 00)	236	30
AIR-SEA TEMP (DEG C)	-04.4	(30 18)	-00.9	00.5	(17 03)	236	30
PRESSURE (MBAR)	0981.0	(14 21)	1003.3	1018.9	(23 09)	236	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		2.1	2.1	1.3			5.5	13.7
NE		2.1	1.7	.8			4.6	12.6
E		1.7	4.2				5.9	12.5
SE	.4	3.0	3.4	.4			7.2	11.0
S		5.5	11.8	2.5			19.8	14.0
SW	.4	4.2	10.5	.8			16.0	13.1
W	.4	4.2	18.6	4.6			27.8	15.7
NW	.4	1.7	9.3	1.3			12.7	16.7
CALM	.4						.4	.0
TOTAL	2.1	24.5	61.6	11.8			100.0	14.2

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 300 DEG; DAY: 18; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 229

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	1.7	39.7	33.2	14.4	10.9				2.2M	6.0M (18 15)

JULY — DATA SUMMARY — 46002

AVERAGE LATITUDE 42.5N — AVERAGE LONGITUDE 130.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.6	(02 15)	14.4	15.6	(31 03)	246	31
SEA TEMP (DEG C)	15.3	(10 18)	15.7	16.2	(31 21)	246	31
AIR-SEA TEMP (DEG C)	-03.0	(02 15)	-01.3	-00.1	(25 21)	246	31
PRESSURE (MBAR)	1019.0	(17 12)	1024.2	1029.0	(21 06)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		2.0	63.4	2.0			67.4	16.0
NE			2.0				2.0	13.4
E								
SE								
S								
SW			.8				.8	12.0
W		2.0	1.2				3.2	9.8
NW		2.8	23.6				26.4	13.2
CALM								
TOTAL		6.8	91.1	2.0			100.0	14.9

MAX WIND — SPEED: 23 KNOTS — DIRECTION: 350 DEG — DAY: 26 — HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		56.1	38.6	3.1					1.7M	3.5M (27 06)

JULY — DATA SUMMARY — 46004

AVERAGE LATITUDE 51.0N — AVERAGE LONGITUDE 136.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.1	(08 03)	12.4	15.1	(30 21)	248	31
SEA TEMP (DEG C)	10.6	(02 15)	12.4	15.4	(31 00)	248	31
AIR-SEA TEMP (DEG C)	-02.1	(08 03)	00.1	01.3	(25 06)	248	31
PRESSURE (MBAR)	1013.5	(08 09)	1024.4	1032.7	(21 21)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		2.4	17.3				19.8	13.6
NE		.4					.4	4.0
E								
SE								
S	.4		1.2	1.2			2.8	18.4
SW		1.2	8.1	.4			9.7	14.0
W		7.3	19.0				26.2	12.6
NW		3.2	37.9				41.1	14.0
CALM								
TOTAL	.4	14.5	83.5	1.6			100.0	13.6

MAX WIND — SPEED: 27 KNOTS — DIRECTION: 190 DEG — DAY: 02 — HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	1.2	79.0	18.5	1.2					1.4M	3.5M (02 03)

JULY — DATA SUMMARY — 46005

AVERAGE LATITUDE 46.0N — AVERAGE LONGITUDE 131.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.3	(06 12)	13.2	15.2	(31 00)	245	31
SEA TEMP (DEG C)	12.3	(02 18)	13.6	15.4	(31 21)	245	31
AIR-SEA TEMP (DEG C)	-02.6	(06 12)	-00.4	00.7	(19 21)	245	31
PRESSURE (MBAR)	1017.2	(08 12)	1023.7	1029.4	(20 21)	245	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 245

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	1.6	32.1				34.5	15.4
NE								
E								
SE								
S			.4				.4	15.1
SW		2.4	.8				3.2	9.6
W	.4	3.3	3.3				6.9	10.3
NW	.8	6.1	48.4				55.3	14.1
CALM								
TOTAL	2.0	13.4	85.0				100.0	14.1

MAX WIND — SPEED: 20 KNOTS — DIRECTION: 340 DEG — DAY: 26 — HOUR: 12

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 246

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	2.0	70.1	27.6						1.6M	2.5M (17 06)

AUGUST — DATA SUMMARY — 46002

AVERAGE LATITUDE 42.5N — AVERAGE LONGITUDE 130.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	14.3	(23 15)	16.5	18.6	(31 21)	248	31
SEA TEMP (DEG C)	16.1	(01 15)	17.4	18.7	(23 00)	248	31
AIR-SEA TEMP (DEG C)	-03.5	(23 15)	-00.8	00.4	(31 21)	248	31
PRESSURE (MBAR)	1010.8	(24 15)	1018.8	1025.8	(06 16)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.6	12.9	24.6	4.4			43.5	14.1
NE	.4	.8					1.2	5.3
E	.4	.4					.8	2.5
SE	.8	1.2					2.0	4.0
S	1.2	.8					2.0	4.2
SW	.4	6.0	3.2				9.7	9.0
W	1.2	8.5	11.7				21.4	10.3
NW	1.6	10.9	5.6				18.1	8.8
CALM	1.2						1.2	.0
TOTAL	6.9	41.5	45.2	4.4			100.0	11.1

MAX WIND — SPEED: 22 KNOTS — DIRECTION: 340 DEG — DAY: 10 — HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	4.4	54.0	22.6	19.0					1.8M	3.5M (13 09)

AUGUST — DATA SUMMARY — 46003

AVERAGE LATITUDE 52.0N — AVERAGE LONGITUDE 156.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.1	(23 12)	11.4	12.4	(19 15)	150	19
SEA TEMP (DEG C)	11.4	(22 18)	12.1	12.9	(19 03)	150	19
AIR-SEA TEMP (DEG C)	-02.3	(19 12)	-00.7	00.4	(30 00)	150	19
PRESSURE (MBAR)	0993.1	(20 00)	1009.8	1022.0	(13 21)	150	19

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 150

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.3	2.0				3.3	10.2
NE	.7	2.0	.7				3.3	7.8
E	.7	3.3	6.7	3.3			14.0	16.0
SE		1.3	20.7	2.7			24.7	16.3
S		1.3	9.3	2.7			13.3	16.8
SW			2.0	7.3			9.3	22.6
W		.7	10.0	6.7	1.3		18.7	22.3
NW			5.3	5.3	2.7		13.3	25.5
CALM								
TOTAL	1.3	10.0	56.7	28.0	4.0		100.0	18.7

MAX WIND — SPEED: 38 KNOTS — DIRECTION: [illegible] DEG — DAY: 21 — HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 149

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		14.8	59.1	15.4	5.4	5.4			2.7M	7.0M (21 12)

AUGUST — DATA SUMMARY — 46004

AVERAGE LATITUDE 51.0N — AVERAGE LONGITUDE 136.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.6	(23 15)	14.6	15.9	(19 03)	248	31
SEA TEMP (DEG C)	14.0	(05 15)	14.9	16.3	(10 03)	248	31
AIR-SEA TEMP (DEG C)	-02.2	(27 03)	-00.3	01.4	(06 06)	248	31
PRESSURE (MBAR)	1002.0	(21 00)	1017.3	1030.5	(10 21)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	3.2	14.5				18.5	13.3
NE	1.6	2.4	1.2				5.2	7.1
E	1.2	3.6	.8				5.6	7.2
SE	.4	1.6	1.2	.8			4.0	10.2
S		4.8	13.7	2.4			21.0	15.0
SW		3.6	10.9	.8			15.3	13.3
W	.8	10.9	7.3				19.0	10.3
NW		6.0	4.4				10.5	10.7
CALM	.8						.8	.0
TOTAL	6.0	36.3	50.0	3.6			100.0	11.9

MAX WIND — SPEED: 29 KNOTS — DIRECTION: 190 DEG — DAY: 20 — HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	.4	71.4	19.4	6.9	2.0				1.6M	4.5M (22 06)

AUGUST — DATA SUMMARY — 46005

AVERAGE LATITUDE 46.0N — AVERAGE LONGITUDE 131.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	13.6	(24 15)	15.6	17.2	(31 12)	248	31
SEA TEMP (DEG C)	14.3	(26 12)	15.8	16.9	(23 03)	248	31
AIR-SEA TEMP (DEG C)	-02.4	(24 15)	-00.2	01.7	(20 09)	248	31
PRESSURE (MBAR)	1007.3	(29 09)	1017.6	1026.2	(06 21)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.8	4.4	30.6	6.5			42.3	16.8
NE		1.2	1.6				2.8	11.0
E	.4	1.6					2.0	4.8
SE		.8	.8				1.6	10.0
S		6.0	6.9				12.9	10.7
SW		8.4	3.6				12.1	9.4
W	1.2	7.3	4.4				12.9	8.0
NW	2.0	7.7	2.8				12.5	6.2
CALM	.8						.8	.0
TOTAL	5.2	37.4	50.8	6.5			100.0	12.3

MAX WIND — SPEED: 25 KNOTS — DIRECTION: 360 DEG — DAY: 10 — HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	4.4	52.0	26.6	16.9					1.8M	3.5M (12 15)

SEPTEMBER — DATA SUMMARY — 46002

AVERAGE LATITUDE 42.5N — AVERAGE LONGITUDE 130.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	14.5	(20 12)	16.9	19.1	(17 18)	239	30
SEA TEMP (DEG C)	17.0	(30 19)	18.4	19.8	(16 00)	238	30
AIR-SEA TEMP (DEG C)	-03.8	(26 18)	-01.4	00.4	(17 15)	238	30
PRESSURE (MBAR)	1003.1	(27 03)	1018.2	1025.7	(30 18)	239	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 239

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.3	13.8	8.4				23.4	9.6
NE	1.3	1.3	2.5				5.0	8.8
E	.4	.4					.8	2.6
SE	.4	.8	.8				2.1	10.6
S		.8	3.8	1.7			6.3	17.8
SW	.8	7.3	6.3	.4			10.9	11.9
W	.8	11.7	15.5	1.3			29.3	12.4
NW	2.1	10.5	8.4				20.9	9.3
CALM	1.3						1.3	.0
TOTAL	8.4	42.7	45.6	3.3			100.0	10.9

MAX WIND — SPEED: 30 KNOTS — DIRECTION: 160 DEG — DAY: 26 — HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 234

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	1.3	36.8	35.0	20.5	6.4				2.2M	5.5M (20 21)

SEPTEMBER — DATA SUMMARY — 46003

AVERAGE LATITUDE 52.0N — AVERAGE LONGITUDE 156.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.0	(30 03)	10.2	12.0	(01 03)	239	30
SEA TEMP (DEG C)	10.4	(30 21)	11.6	12.8	(09 03)	238	30
AIR-SEA TEMP (DEG C)	-05.9	(30 03)	-01.4	-00.2	(25 09)	238	30
PRESSURE (MBAR)	0991.2	(09 18)	1008.9	1027.1	(22 12)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.7	9.7	3.4			14.7	17.4
NE		.8		2.5			3.4	22.5
E	.4	.8	.8	1.3	.4		3.8	19.9
SE	.4	.8	2.9	2.1			6.3	16.9
S		2.1	2.9	.8			5.9	14.8
SW		2.5	7.1	1.3			10.9	15.0
W		2.1	13.9	15.5			31.5	19.9
NW	.4	1.7	11.8	9.2			23.1	16.9
CALM	.4						.4	.0
TOTAL	1.7	12.6	49.2	36.1	.4		100.0	18.3

MAX WIND — SPEED: 34 KNOTS — DIRECTION: 080 DEG — DAY: 24 — HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 166

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	1.2	34.3	37.3	24.7	2.4				2.2M	[illegible] (15 09)

SEPTEMBER — DATA SUMMARY — 46004

AVERAGE LATITUDE 51.0N — AVERAGE LONGITUDE 136.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.8	(30 21)	13.7	16.5	(17 15)	237	30
SEA TEMP (DEG C)	12.7	(29 12)	14.1	16.3	(04 00)	239	30
AIR-SEA TEMP (DEG C)	-03.0	(30 21)	-00.4	02.1	(17 15)	237	30
PRESSURE (MBAR)	0987.6	(18 00)	1009.8	1024.6	(12 09)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.1	5.5	6.3	2.1			16.0	11.9
NE	1.3	.4	.8				2.5	9.7
E	1.7	.8	1.3	2.5			6.3	15.0
SE	.4	2.1	2.1	2.9			7.6	17.6
S		3.4	7.6	11.3	1.3		23.5	20.4
SW		1.7	8.0	5.5	.4		15.5	19.6
W	.8	2.5	11.8	4.2			19.3	16.0
NW	1.3	.8	3.8	2.1			8.0	14.7
CALM	1.3						1.3	.0
TOTAL	8.8	17.2	41.6	30.7	1.7		100.0	16.5

MAX WIND — SPEED: 46 KNOTS — DIRECTION: 170 DEG — DAY: 18 — HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 236

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	4.2	15.7	36.0	22.0	10.2	2.5	.4	.4	2.6M	10.9M (18 06)

SEPTEMBER — DATA SUMMARY — 46005

AVERAGE LATITUDE 46.0N — AVERAGE LONGITUDE 131.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.2	(23 06)	15.7	18.1	(17 21)	237	30
SEA TEMP (DEG C)	13.7	(06 12)	16.2	17.4	(07 03)	214	30
AIR-SEA TEMP (DEG C)	-03.8	(23 06)	-00.5	02.7	(06 12)	214	30
PRESSURE (MBAR)	0995.6	(27 03)	1015.2	1025.4	(12 18)	237	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		3.0	4.6				7.6	11.2
NE	.8	1.7					2.5	4.2
E	2.1	1.3					3.4	3.4
SE	2.1	1.7	1.7	.8			6.3	10.5
S	.8	7.6	11.0	.4			19.8	11.9
SW	.4	4.6	7.6				12.7	12.0
W	2.1	8.9	19.8	2.5			33.3	12.9
NW	1.3	5.5	6.3				13.1	11.6
CALM	1.3						1.3	.0
TOTAL	11.0	34.2	51.1	3.8			100.0	11.4

MAX WIND — SPEED: 29 KNOTS — DIRECTION: 290 DEG — DAY: 20 — HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 234

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	5.1	27.8	36.3	17.9	11.5	1.7			2.4M	6.5M (21 00)

JULY — D A T A S U M M A R Y — 46006

AVERAGE LATITUDE 40.7N — AVERAGE LONGITUDE 137.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	13.2	(10 12)	16.7	19.6	(03 00)	248	31
SEA TEMP (DEG C)	15.7	(16 18)	16.4	17.5	(31 21)	248	31
AIR-SEA TEMP (DEG C)	-02.9	(10 12)	-00.2	02.6	(03 00)	248	31
PRESSURE (MBAR)	1023.0	(03 12)	1029.1	1033.4	(25 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		16.9	31.0				48.0	11.4
NE		13.3	21.4				34.7	11.5
E		1.6	2.4				4.0	10.8
SE		.8	.4				1.2	10.7
S		2.0	2.0				4.0	10.1
SW	.4						.4	3.0
W		.8	2.4				3.2	12.9
NW		2.0	2.4				4.4	10.9
CALM								
TOTAL	.4	37.5	62.1				100.0	11.3

MAX WIND — SPEED: 17 KNOTS; DIRECTION: 020 DEG; DAY: 27; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	3.2	96.4	.4						1.1M	2.0M	(10 00)

JULY — D A T A S U M M A R Y — 46010

AVERAGE LATITUDE 46.2N — AVERAGE LONGITUDE 124.2W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.6	(07 12)	13.7	16.0	(27 00)	246	31
SEA TEMP (DEG C)	11.1	(02 15)	14.4	17.9	(31 00)	246	31
AIR-SEA TEMP (DEG C)	-03.5	(26 21)	-00.7	02.1	(27 12)	246	31
PRESSURE (MBAR)	1012.9	(17 03)	1019.6	1025.7	(14 06)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.0	21.1	18.7				41.9	10.4
NE	.4	.4	.4				1.2	8.0
E		.8					.8	6.5
SE		.8					.8	6.0
S	.4	3.3	1.2				4.9	7.2
SW	1.6	9.8					11.4	5.4
W	3.7	8.9	.4				13.0	5.2
NW	1.2	22.0	2.8				26.0	7.5
CALM								
TOTAL	9.3	67.1	23.6				100.0	8.1

MAX WIND — SPEED: 21 KNOTS; DIRECTION: 340 DEG; DAY: 02; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 185

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	2.2	89.7	8.1						1.3M	2.0M	(28 12)

JULY — D A T A S U M M A R Y — 46011

AVERAGE LATITUDE 34.9N — AVERAGE LONGITUDE 120.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	11.3	(19 15)	13.9	17.7	(08 21)	247	31
SEA TEMP (DEG C)	13.0	(19 03)	15.0	17.6	(09 00)	247	31
AIR-SEA TEMP (DEG C)	-04.1	(19 15)	-01.1	01.5	(08 15)	247	31
PRESSURE (MBAR)	1009.5	(06 12)	1013.5	1017.5	(31 18)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.0	2.8	.4				5.3	5.6
NE	.4						.4	2.0
E	1.2						1.2	1.4
SE	1.6						1.6	1.3
S		.8					.8	4.6
SW	1.2	.8					2.0	3.2
W	3.6	7.7					11.3	4.5
NW	3.6	39.3	32.4	.4			75.7	10.2
CALM	1.6						1.6	.0
TOTAL	15.4	51.4	32.8	.4			100.0	8.7

MAX WIND — SPEED: 22 KNOTS; DIRECTION: 320 DEG; DAY: 13; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	3.2	64.8	30.4	1.6					1.5M	3.0M	(08 06)

JULY — D A T A S U M M A R Y — 46012

AVERAGE LATITUDE 37.4N — AVERAGE LONGITUDE 122.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.7	(19 15)	12.1	13.7	(10 00)	248	31
SEA TEMP (DEG C)	11.3	(19 12)	12.8	13.8	(29 00)	249	31
AIR-SEA TEMP (DEG C)	-02.5	(20 06)	-00.5	01.0	(03 00)	248	31
PRESSURE (MBAR)	1011.8	(26 03)	1015.2	1018.8	(31 21)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 249

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	3.2	.4				4.0	7.2
NE								
E								
SE		1.2					1.2	5.0
S	2.0	10.9					12.9	6.1
SW	3.6	2.4					6.0	3.3
W	1.6	9.7					11.3	5.0
NW	2.8	35.9	23.8				62.5	9.5
CALM	2.4						2.4	.0
TOTAL	12.9	62.9	24.2				100.0	7.8

MAX WIND — SPEED: 21 KNOTS; DIRECTION: 320 DEG; DAY: 07; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	2.0	57.5	37.9	2.6					1.6M	3.0M	(11 09)

AUGUST — D A T A S U M M A R Y — 46006

AVERAGE LATITUDE 40.7N — AVERAGE LONGITUDE 137.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	17.4	(13 06)	19.6	23.0	(08 03)	248	31
SEA TEMP (DEG C)	17.2	(01 18)	18.7	20.0	(21 00)	248	31
AIR-SEA TEMP (DEG C)	-01.9	(22 00)	00.9	03.8	(30 18)	248	31
PRESSURE (MBAR)	1015.9	(19 03)	1022.0	1029.3	(07 21)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	5.6	4.4				11.3	9.7
NE	1.2	4.8	12.9				19.0	13.4
E	3.2	6.5	.4				10.1	4.9
SE	1.6	3.2					4.8	4.8
S	.4	6.9					7.3	7.2
SW	.4	5.2	8.5				14.1	11.7
W	.4	6.0	6.0				12.5	10.9
NW		7.3	13.7				21.0	12.4
CALM								
TOTAL	8.5	45.6	46.0				100.0	10.5

MAX WIND — SPEED: 21 KNOTS; DIRECTION: 050 DEG; DAY: 11; HOUR: 12

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY		66.5	30.6	2.8					1.6M	3.0M	(23 18)

AUGUST — D A T A S U M M A R Y — 46010

AVERAGE LATITUDE 46.2N — AVERAGE LONGITUDE 124.2W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	11.4	(18 15)	14.7	22.5	(09 21)	247	31
SEA TEMP (DEG C)	11.9	(07 09)	15.1	18.0	(11 00)	246	31
AIR-SEA TEMP (DEG C)	-03.8	(18 15)	-00.4	04.3	(09 18)	246	31
PRESSURE (MBAR)	1009.7	(23 18)	1016.7	1023.8	(27 18)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.4	15.8	22.3				40.5	10.6
NE	.8	.8					1.6	3.8
E	2.0						2.0	2.0
SE	2.8	2.0					4.9	3.9
S	1.6	18.2	8.1				27.9	6.9
SW	2.0	4.5					6.5	4.9
W	2.4	2.4					4.9	3.5
NW	1.2	7.7	2.4				11.3	7.5
CALM	.4						.4	.0
TOTAL	15.8	51.4	32.8				100.0	8.4

MAX WIND — SPEED: [illegible] KNOTS; DIRECTION: 350 DEG; DAY: [illegible]; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	17.8	53.4	27.1	1.6					1.4M	3.0M	(23 15)

AUGUST — D A T A S U M M A R Y — 46011

AVERAGE LATITUDE 34.9N — AVERAGE LONGITUDE 120.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.9	(06 15)	13.9	17.2	(15 00)	246	31
SEA TEMP (DEG C)	13.1	(05 12)	14.3	16.7	(15 00)	246	31
AIR-SEA TEMP (DEG C)	-03.0	(06 15)	-00.4	01.6	(21 00)	246	31
PRESSURE (MBAR)	1005.2	(28 12)	1012.3	1018.3	(15 18)	246	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 246

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	9.3	1.6				12.2	6.9
NE		.4					.4	5.0
E	1.2						1.2	2.1
SE								
S								
SW	1.2						1.2	2.0
W	1.2	3.7					4.9	5.5
NW	2.4	24.0	49.6	2.8			78.9	12.7
CALM	1.2						1.2	.0
TOTAL	6.5	37.4	51.2	2.8			100.0	11.2

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 320 DEG; DAY: 21; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 245

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	1.2	55.5	43.3						1.6M	2.5M	(31 21)

AUGUST — D A T A S U M M A R Y — 46012

AVERAGE LATITUDE 37.4N — AVERAGE LONGITUDE 122.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.9	(06 18)	13.1	15.7	(18 21)	248	31
SEA TEMP (DEG C)	12.1	(10 15)	13.5	15.5	(24 21)	248	31
AIR-SEA TEMP (DEG C)	-02.5	(28 21)	-00.4	01.7	(18 21)	248	31
PRESSURE (MBAR)	1006.9	(28 12)	1014.5	1020.3	(01 21)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 248

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.0	1.2					3.2	3.8
NE								
E								
SE								
S	3.4	4.6					8.1	3.8
SW	1.6	1.6					3.2	3.8
W	4.4	4.4					8.9	3.6
NW	2.0	37.5	34.3				73.8	9.7
CALM	2.4						2.4	.0
TOTAL	14.5	49.2	34.3				100.0	6.0

MAX WIND — SPEED: 17 KNOTS; DIRECTION: 320 DEG; DAY: 26; HOUR: 21

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 248

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	4.0	65.3	29.0	1.6					1.5M	3.0M	(31 12)

SEPTEMBER — D A T A S U M M A R Y — 46006

AVERAGE LATITUDE 40.7N — AVERAGE LONGITUDE 137.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	15.0	(23 06)	19.6	24.8	(10 00)	238	30
SEA TEMP (DEG C)	17.4	(30 15)	19.1	20.9	(12 00)	238	30
AIR-SEA TEMP (DEG C)	-03.8	(23 06)	00.5	04.6	(09 18)	238	30
PRESSURE (MBAR)	0998.2	(17 03)	1019.2	1026.8	(30 06)	238	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 238

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.3	5.5	2.9				9.7	9.0
NE	1.7	2.1	3.8				7.6	9.8
E	1.7	3.8	1.7				7.1	7.1
SE	.8	2.9	.8	.8			5.5	9.6
S	.4	3.8	11.3	3.8			19.3	15.8
SW	.4	1.7	3.8	1.7			7.6	15.9
W		2.1	16.4	3.4			21.8	16.0
NW	.8	6.7	10.1	2.9			20.6	13.2
CALM	.8						.8	.0
TOTAL	8.0	28.6	50.4	12.6			100.0	13.1

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 180 DEG; DAY: 16; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 233

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY		29.6	40.3	17.6	12.0	.4			2.4M	6.0M	(27 12)

SEPTEMBER — D A T A S U M M A R Y — 46010

AVERAGE LATITUDE 46.2N — AVERAGE LONGITUDE 124.2W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.7	(29 09)	14.5	24.4	(07 03)	237	30
SEA TEMP (DEG C)	10.9	(15 06)	15.1	18.2	(07 06)	237	30
AIR-SEA TEMP (DEG C)	-04.1	(29 09)	-00.6	07.2	(07 03)	237	30
PRESSURE (MBAR)	1008.6	(27 03)	1017.6	1025.8	(30 21)	237	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4	8.0	14.3				22.8	11.9
NE	.4	2.5	.8				3.8	7.9
E	.4	2.5	3.8				6.8	11.6
SE	.4	2.5	1.3				4.2	8.8
S	.8	18.1	20.3	1.3			40.5	11.6
SW	.4	5.5	4.2				10.1	9.4
W	1.3	3.4	1.3				5.9	7.4
NW	1.3	3.0	1.3				5.5	7.6
CALM	.4						.4	.0
TOTAL	5.9	45.6	47.3	1.3			100.0	10.7

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 180 DEG; DAY: 20; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 236

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	9.8	49.4	26.8	9.8	3.8	.4			1.8M	6.5M	(21 18)

SEPTEMBER — D A T A S U M M A R Y — 46011

AVERAGE LATITUDE 34.9N — AVERAGE LONGITUDE 120.9W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.0	(01 12)	14.2	16.4	(30 18)	235	30
SEA TEMP (DEG C)	12.8	(26 03)	15.0	16.6	(05 21)	235	30
AIR-SEA TEMP (DEG C)	-02.7	(12 12)	-00.8	02.0	(30 18)	235	30
PRESSURE (MBAR)	1009.3	(05 03)	1013.8	1019.0	(25 06)	235	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 235

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.1	6.8	3.8				12.8	8.0
NE	.4	.4					.9	3.8
E	1.3	.4					1.7	3.5
SE	.9	.4					1.3	2.3
S	1.3	.4					1.7	3.7
SW	3.0						3.0	1.1
W	3.4	3.0					6.4	3.7
NW	1.7	19.6	47.2	2.1			70.6	13.1
CALM	1.7						1.7	.0
TOTAL	15.7	31.1	51.1	2.1			100.0	10.7

MAX WIND — SPEED: 23 KNOTS; DIRECTION: 330 DEG; DAY: 29; HOUR: 15

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 232

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	3.9	60.8	31.0	4.3					1.6M	3.5M	(29 15)

SEPTEMBER — D A T A S U M M A R Y — 46012

AVERAGE LATITUDE 37.4N — AVERAGE LONGITUDE 122.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.7	(04 09)	13.4	15.8	(21 00)	234	30
SEA TEMP (DEG C)	11.6	(06 15)	13.0	14.9	(17 00)	234	30
AIR-SEA TEMP (DEG C)	-01.4	(26 15)	00.4	02.1	(21 00)	234	30
PRESSURE (MBAR)	1008.7	(05 12)	1015.9	1021.4	(18 18)	235	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — SPEED (KNOTS) — NO. OF OBS: 235

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	3.8	3.4	2.1				9.4	5.9
NE	.9	.9					1.7	5.8
E	.9						.9	2.1
SE	3.0	3.0	1.7				7.7	6.3
S	3.0	7.7	2.1				12.8	6.5
SW	2.6	.4					3.0	2.7
W	3.4	4.7					8.1	3.7
NW	6.8	25.1	20.4				52.3	8.9
CALM	4.3						4.3	.0
TOTAL	28.5	45.1	26.4				100.0	7.0

MAX WIND — SPEED: 21 KNOTS; DIRECTION: 320 DEG; DAY: 22; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 231

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX	(DA HR)
% FREQUENCY	13.4	43.7	35.5	7.4					1.7M	3.5M	(22 06)

JULY — DATA SUMMARY — 46013
AVERAGE LATITUDE 38.2N — AVERAGE LONGITUDE 123.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	08.6	(19 12)	11.0	13.1	(06 00)	247	31
SEA TEMP (DEG C)	09.1	(13 15)	10.1	12.0	(28 00)	247	31
AIR-SEA TEMP (DEG C)	-01.6	(29 12)	00.9	03.2	(14 03)	247	31
PRESSURE (MBAR)	1011.3	(25 03)	1015.7	1019.3	(20 21)	247	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.2	1.6	.4				3.2	5.5
NE								
E	.4	.4					.8	3.1
SE	1.6	4.0					5.7	5.6
S	1.7	3.2					4.9	5.6
SW	.8						.8	2.0
W	1.6	4.0	2.4				8.1	7.2
NW	2.0	8.9	40.5	21.9			73.3	17.0
CALM	3.6						3.6	.0
TOTAL	12.6	22.3	43.3	21.9			100.0	13.9

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 300 DEG; DAY: 10; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 247

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	8.9	32.4	54.3	4.5					1.8M	3.0M (25 09)

JULY — DATA SUMMARY — 46014
AVERAGE LATITUDE 39.2N — AVERAGE LONGITUDE 124.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	08.9	(01 15)	11.3	13.6	(06 00)	219	31
SEA TEMP (DEG C)	09.4	(23 15)	10.8	13.2	(06 00)	216	31
AIR-SEA TEMP (DEG C)	-02.1	(01 15)	00.5	02.8	(14 03)	216	31
PRESSURE (MBAR)	1009.5	(26 03)	1014.2	1018.4	(13 18)	227	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		7.6	25.7	.8			34.2	14.1
NE	.4	.4					.8	4.0
E								
SE	.4	.4					.8	4.5
S	2.5	4.2	1.7				8.4	6.6
SW	.4						.4	2.0
W	.8						.8	2.5
NW	.8	4.6	34.2	12.2			51.9	16.8
CALM	2.5						2.5	.0
TOTAL	8.0	17.3	61.6	13.1			100.0	14.2

MAX WIND — SPEED: 28 KNOTS; DIRECTION: 330 DEG; DAY: 07; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 137

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	10.2	18.2	56.9	14.6					2.0M	3.5M (21 06)

JULY — DATA SUMMARY — 51001
AVERAGE LATITUDE 23.4N — AVERAGE LONGITUDE 162.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.6	(12 03)	25.3	26.4	(21 03)	128	31
SEA TEMP (DEG C)	25.6	(03 18)	26.1	26.5	(31 03)	121	31
AIR-SEA TEMP (DEG C)	-02.8	(12 03)	-00.8	-00.1	(25 21)	121	31
PRESSURE (MBAR)	1014.5	(05 03)	1018.4	1026.7	(10 21)	138	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 140

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N								
NE		5.7	31.4				37.1	13.5
E		8.6	52.9				61.4	13.6
SE			1.4				1.4	12.0
S								
SW								
W								
NW								
CALM								
TOTAL		14.3	85.7				100.0	13.6

MAX WIND — SPEED: 20 KNOTS; DIRECTION: 060 DEG; DAY: 15; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 34

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		38.2	61.8						1.9M	2.5M (01 09)

AUGUST — DATA SUMMARY — 46013
AVERAGE LATITUDE 38.2N — AVERAGE LONGITUDE 123.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	08.7	(08 15)	11.9	16.0	(19 21)	248	31
SEA TEMP (DEG C)	09.4	(05 18)	10.6	12.7	(16 00)	248	31
AIR-SEA TEMP (DEG C)	-01.1	(08 15)	01.4	03.8	(19 21)	248	31
PRESSURE (MBAR)	1007.0	(29 03)	1014.9	1021.5	(15 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 247

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	.4						.4	3.0
NE		.4					.4	5.0
E								
SE	.8	.4					1.2	3.0
S	.4						.4	2.0
SW	.4	2.8					3.2	4.8
W	.8	17.0	8.5	3.6			30.0	11.8
NW	1.6	5.3	36.0	20.2			63.2	18.4
CALM	1.2						1.2	.0
TOTAL	5.7	25.9	44.5	23.9			100.0	15.4

MAX WIND — SPEED: 31 KNOTS; DIRECTION: 310 DEG; DAY: 05; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 45

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		33.3	66.7						1.9M	2.5M (05 06)

AUGUST — DATA SUMMARY — 46014
AVERAGE LATITUDE 39.2N — AVERAGE LONGITUDE 124.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	10.2	(08 12)	12.8	15.0	(18 21)	231	31
SEA TEMP (DEG C)	10.0	(31 18)	12.3	15.5	(15 00)	229	31
AIR-SEA TEMP (DEG C)	-01.9	(23 18)	00.5	02.9	(30 21)	229	31
PRESSURE (MBAR)	1007.1	(13 06)	1013.5	1019.8	(15 18)	248	31

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 244

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	5.3	13.9	20.1	1.6			40.9	11.7
NE	.8						.8	2.8
E	1.2						1.2	2.0
SE	1.2	.8					2.0	4.0
S	1.6	2.5	.8				4.9	6.7
SW	.8	.4					1.2	4.3
W	.4	.4					.8	3.5
NW	2.0	7.8	33.6	5.7			49.2	15.1
CALM	1.2						1.2	.0
TOTAL	12.7	25.8	54.1	7.4			100.0	12.8

MAX WIND — SPEED: 26 KNOTS; DIRECTION: 320 DEG; DAY: 31; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 147

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	.7	50.3	36.7	12.2					1.8M	3.0M (31 21)

AUGUST — DATA SUMMARY — 51001
AVERAGE LATITUDE 23.4N — AVERAGE LONGITUDE 162.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	25.4	(21 15)	26.2	26.7	(31 03)	101	13
SEA TEMP (DEG C)	26.5	(20 18)	26.9	27.3	(27 06)	101	13
AIR-SEA TEMP (DEG C)	-01.3	(31 15)	-00.7	-00.1	(20 03)	101	13
PRESSURE (MBAR)	1014.7	(26 03)	1017.8	1021.0	(19 09)	101	13

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 101

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N								
NE		8.9	27.7				36.6	12.8
E		22.8	29.7				52.5	11.0
SE		4.9					4.9	7.2
S		2.0					2.0	7.1
SW								
W								
NW								
CALM								
TOTAL		42.6	57.4				100.0	11.3

MAX WIND — SPEED: 20 KNOTS; DIRECTION: 060 DEG; DAY: 20; HOUR: 09

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 94

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		80.9	19.1						1.6M	2.5M (20 18)

SEPTEMBER — DATA SUMMARY — 46013
AVERAGE LATITUDE 38.2N — AVERAGE LONGITUDE 123.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.3	(04 15)	12.8	15.4	(17 00)	235	30
SEA TEMP (DEG C)	09.7	(02 15)	11.6	14.4	(16 09)	235	30
AIR-SEA TEMP (DEG C)	-01.3	(04 18)	01.2	03.6	(22 00)	235	30
PRESSURE (MBAR)	1008.4	(02 03)	1016.7	1022.8	(08 18)	239	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 236

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		.4					.4	4.0
NE	.4	1.3					1.7	4.5
E	1.7	1.7	1.7				5.1	7.6
SE	.4	5.5	.9				6.8	7.0
S	.9	1.7	.9				3.4	6.0
SW	2.1	1.3					3.4	3.0
W	3.4	11.1	7.2	1.3			23.0	9.2
NW	2.6	9.8	23.4	18.3			54.0	17.3
CALM	2.1						2.1	.0
TOTAL	13.6	32.8	34.0	19.6			100.0	12.7

MAX WIND — SPEED: 30 KNOTS; DIRECTION: 300 DEG; DAY: 22; HOUR: 03

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 153

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	9.8	37.3	43.1	9.8					1.8M	3.5M (30 03)

SEPTEMBER — DATA SUMMARY — 46014
AVERAGE LATITUDE 39.2N — AVERAGE LONGITUDE 124.0W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	09.4	(06 12)	12.9	17.0	(29 00)	115	18
SEA TEMP (DEG C)	09.4	(01 18)	12.7	17.6	(29 21)	122	21
AIR-SEA TEMP (DEG C)	-02.3	(08 18)	00.1	02.8	(01 00)	115	18
PRESSURE (MBAR)	1007.1	(19 21)	1013.8	1019.1	(08 21)	126	23

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 193

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	4.1	13.5	17.6	1.6			36.8	11.3
NE		.5	.5				1.0	8.8
E	1.0	1.6					2.6	4.2
SE		4.7	.5				5.2	6.9
S	2.6	6.7	3.6				13.0	7.7
SW								
W	.5						.5	2.0
NW	.5	9.7	16.1	16.1			38.3	18.7
CALM	2.6						2.6	.0
TOTAL	11.4	32.6	38.3	17.6			100.0	12.9

MAX WIND — SPEED: 30 KNOTS; DIRECTION: 330 DEG; DAY: 28; HOUR: 00

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 152

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	8.8	18.6	57.8	12.7	2.0				2.1M	4.0M (30 03)

SEPTEMBER — DATA SUMMARY — 51001
AVERAGE LATITUDE 23.4N — AVERAGE LONGITUDE 162.3W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	23.8	(08 18)	26.4	27.3	(22 03)	237	30
SEA TEMP (DEG C)	26.8	(12 18)	27.1	27.7	(16 03)	237	30
AIR-SEA TEMP (DEG C)	-03.9	(08 18)	-00.7	-00.1	(24 03)	237	30
PRESSURE (MBAR)	1013.0	(10 03)	1016.6	1020.9	(09 21)	237	30

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 237

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N		1.3	.8				2.1	8.9
NE	.4	21.5	17.3				39.2	10.1
E	.4	13.9	43.0				57.4	12.3
SE		.4	.8				1.3	11.3
S								
SW								
W								
NW								
CALM								
TOTAL	.8	37.1	62.0				100.0	11.3

MAX WIND — SPEED: 20 KNOTS; DIRECTION: 070 DEG; DAY: 04; HOUR: 06

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 234

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY		51.3	48.7						1.8M	2.5M (22 00)

SEPTEMBER — DATA SUMMARY — 41004
AVERAGE LATITUDE 32.6N — AVERAGE LONGITUDE 078.7W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	19.8	(19 18)	25.1	28.8	(14 18)	186	24
SEA TEMP (DEG C)	25.9	(22 15)	26.9	28.9	(14 18)	186	24
AIR-SEA TEMP (DEG C)	-07.0	(19 18)	-01.8	00.5	(18 06)	186	24
PRESSURE (MBAR)	1008.2	(09 09)	1017.3	1025.2	(26 15)	186	24

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 183

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	2.7	2.7	7.8				17.4	10.1
NE		7.0	17.7				24.7	12.2
E	.8	9.4	4.4				14.6	9.3
SE		3.8					3.8	7.3
S	.8	9.9	3.8				14.2	9.2
SW	.8	9.9	8.8				19.5	11.4
W	2.8	6.5	9.9				18.9	9.1
NW	3.3	1.6	2.7				8.0	8.1
CALM	4.3						4.3	.0
TOTAL	11.5	38.2	50.5				100.0	9.9

MAX WIND — SPEED: 19 KNOTS; DIRECTION: 050 DEG; DAY: 23; HOUR: 18

WAVES - % FREQUENCIES, MEAN AND EXTREME (METERS) — NO. OF WAVE OBS: 182

HEIGHT (M)	<1	1-1.5	2-2.5	3-3.5	4-5.5	6-7.5	8-9.5	>9.5	MEAN	MAX (DA HR)
% FREQUENCY	38.7	60.0	3.8						.9M	2.0M (30 09)

SEPTEMBER — DATA SUMMARY — 42011
AVERAGE LATITUDE 29.6N — AVERAGE LONGITUDE 093.5W

MEANS AND EXTREMES	MIN	(DA HR)	MEAN	MAX	(DA HR)	NO. OF OBS	DAYS WITH DATA
AIR TEMP (DEG C)	12.3	(18 12)	24.8	28.4	(29 18)	102	14
PRESSURE (MBAR)	1013.9	(21 09)	1018.4	1025.3	(18 12)	102	14

WIND - % FREQUENCIES, MEANS AND EXTREMES — NO. OF OBS: 91

DIR	<4	4-10	11-21	22-33	34-47	>47	TOTAL %	MEAN SPEED (KNOTS)
N	1.1	1.1					2.2	3.1
NE	2.2	11.0	2.2				15.4	6.7
E		11.0	11.0				22.0	10.2
SE	1.1	20.9	14.3				36.3	10.0
S	1.1	16.5	2.2				19.8	7.2
SW	2.2	1.1					3.3	2.7
W		1.1					1.1	9.1
NW								
CALM								
TOTAL	7.7	62.6	29.7				100.0	8.5

MAX WIND — SPEED: 19 KNOTS; DIRECTION: 120 DEG; DAY: 21; HOUR: 18

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